THE RAILWAY GAZETTE
A Journal of Management, Engineering and Operation
INCORPORATING
The Railway Engineer · TRANSPORT · The Railway News
The Railway Times · Herapath's Railway Journal ESTABLISHED 1835 · RAILWAY RECORD. · RAILWAYS ILLUSTRATED · THE RAILWAY OFFICIAL GAZETTE

PUBLISHED EVERY FRIDAY
AT
33, TOTHILL STREET, WESTMINSTER, LONDON, S.W.1

Telegraphic Address: "TRAZETTE PARL., LONDON"
Telephone No.: WHITEHALL 9233 (6 lines)

Annual subscription payable in advance and postage free:
British Isles and Abroad.....£2 5s. 0d.
Single Copies.....One Shilling
Registered at the General Post Office, London, as a Newspaper

VOL. 66. No. 26 FRIDAY, JUNE 25, 1937

CONTENTS

ELECTRIC RAILWAY TRACTION

A Supplement illustrating and describing developments in Electric Railway Traction is presented with each copy of this week's issue.

Golders Green: A Tube-Made District

"HUMAN INTEREST" stories concerning the genesis of a railway enterprise will seldom stand the test of close examination, but one relating to the present century and to two well-known men (of whom one is still with us) has less chance of being apocryphal. The story in question concerns the formation of the Hampstead tube, which was opened to Golders Green just thirty years ago—on June 22, 1907, to be precise. Thirty-two years ago, the well-known American tube promoter Mr. Charles Tyson Yerkes, and Mr. Dalrymple Hay (now Sir Harley Dalrymple Hay, the consulting engineer) took a hansom-cab from the West End to prospect for a new tube railway to serve north-west London. As they drove up Charing Cross Road, Tottenham Court Road, Hampstead Road, and Haverstock Hill, they planned the course of the tube and where the stations were to be. At Hampstead Heath they had intended to terminate the line, but Mr. Yerkes decided to take the cab on further; so on they went past the old "Bull and Bush" across green fields to Golders Green cross roads, where stood nothing but a farmhouse. "This is the place for our terminus" said Mr. Yerkes. "Crazy!" said his companion "There will never be any traffic here." "There will be one day" said Mr. Yerkes, "and this is the site for the station." Today the traffic at Golders Green station totals 13 million passengers per annum; four million a year change here from road to rail; and, incidentally, land values have appreciated by 600 per cent.

We Hide Our Heads

No sooner were the first complimentary exchanges of the Coronation season ended, than visitors from the Empire began writing to the papers in gentle disparagement of the modern Englishman. These criticisms, largely based upon observations of his demeanour in suburban trains, were various, but we noticed several which condemned his habit of travelling to and from his work with his head "buried in his newspaper." We must confess, however, that when we pass in review the long line of heads we have known during the currency of our season tickets, we remember few that have not gained in apparent sagacity from being thus partly concealed behind a façade of print. Perhaps the reason lies not so much with the heads, as with the faces attached thereto. Travel is said to broaden the mind, but travel on the morning and evening business trains rarely causes this intellectual burgeoning to be reflected in the features. We are strongly of the opinion, therefore, that the Englishman should continue to lurk amid his literary camouflage. As long as our neighbour in the train buries his head in his own newspaper and not in ours, he shall be safe from our censure.

* * * *

The Week's Traffics

Receipts of the four main line railways are still rising, and the return for the past week shows a combined increase of £170,000 compared with £139,000 in the previous week. This brings the total traffics of the four companies for the 24 weeks of the present year to £71,489,000, an increase of £3,193,000, or 4·68 per cent. In passenger train receipts the best percentage increase to date is the 5·94 per cent. of the Southern. The London & North Eastern comes first in the percentage increase in merchandise, with 4·51 per cent., and the advance in coal class receipts on the Great Western is as much as 10·76 per cent., followed by the L.M.S.R. increase of 7·66 per cent., and the L.N.E.R. increase of 6·51 per cent.

	24th Week				Year to date	
	Pass., &c.	Goods, &c.	Coal, &c.	Total	Inc. or Dec.	
	£	£	£	£	£	%
L.M.S.R. ..	+ 14,000	+ 20,000	+ 5,000	+ 39,000	+1,211,000	+ 4·36
L.N.E.R. ..	+ 25,000	+ 34,000	+17,000	+ 76,000	+1,037,000	+ 5·12
G.W.R. ..	+ 17,000	+ 12,000	+15,000	+ 44,000	+ 614,000	+ 5·41
S.R.	+ 9,000	+ 2,000	—	+ 11,000	+ 331,000	+ 3·73

Great Northern Railway (Ireland) receipts for last week improved by £400, and the Great Southern by £2,180.

* * * *

Pullman Incorporated

In the sleeping car business of Pullman Incorporated a profit of $4,193,324 in 1936 contrasted with a loss of $1,646,980 in 1935, and was the highest since 1930. The improvement in gross revenue from sleeping car operations proceeded at an accelerating pace during 1936 as a result of the expanding industrial recovery and the special stimulus afforded by the sharply reduced travel costs now in effect throughout the United States, following the reduction in rail rates and the elimination of the Pullman surcharge as from June 1, 1936, in Eastern territory. A special impetus to travel was also given by the inauguration during 1936 of the streamline trains, carrying sleeping cars, between Chicago and the Pacific Coast and between Chicago and Denver, which reduced the running time by approximately 14 hours between the former and 12 hours between the latter points. The number of passengers using the cars rose from 15,478,708 to 17,197,736, and the gross revenue from cars increased from $46,758,260 to $52,645,993, with an average revenue per car of $9,831 against $9,246, and an average journey per passenger of 486 miles, against 462. Lightweight Pullman sleeping cars

for high-speed operation are to be introduced this year on several of the important trains in the East. The manufacturing business showed a profit of $2,744,775 in 1936 compared with $228,717 in 1935.

* * * *

Mexican Railway Results

Gross receipts of the Mexican Railway Company for the second half of 1936 improved by 7 per cent. in comparison with the second six months of 1935, and there was an increase under all headings except express. Working expenses, however, increased by 9·4 per cent., and the operating ratio rose from 98·52 per cent. to 101·52 per cent. The full effect of the decree granting all workers the seventh day of rest with full wages has been felt in the half-year under review, and disbursements for wages now amount to nearly 60 per cent. of the gross receipts. At the standard rate of 18 pesos to the £ the deficit transferred to net revenue account is £5,954 (against a profit of £4,567 for the second half of 1935), and the final deficiency for the half year is £80,647, which increases the total debit to £707,139. Some figures for the complete years 1936 and 1935 are compared herewith:—

	1936 Pesos	1935 Pesos
Passenger receipts	3,526,217	3,193,173
Goods receipts	9,842,732	9,062,674
Gross receipts	13,944,092	12,961,864
Working expenses	13,949,082	12,281,943
Net receipts	Dr. 4,990	679,921

Traffics during the first four months of the current half year have expanded by about 22 per cent., but strikes and threats of strikes in other industries, and the continually increasing cost of labour, are retarding developments.

* * * *

New Halts on the G.W.R.

The announcement on page 1218 this week of new halts to be opened by the Great Western Railway, is accompanied by some particulars of the satisfactory increase in traffic achieved in this way during the past ten years. In that period alone, the G.W.R. has opened 150 halts in rural areas, suburbs of large towns, and along the coast. Together, they serve a residential population of between 30,000 and 40,000, which would otherwise be without convenient railway facilities. To make the halts pay, various economies in construction and operation have been investigated and adopted, but in some cases the original plans have had to be elaborated to cater for growing traffic. In welcoming the advent of new halts, one cannot forget the possible apprehension of regular travellers, who criticise them as the cause of extra stops in their daily journeys. Such delays, however, are apt to be overestimated, for the time standing is often balanced by acceleration *en route*. Numerous halts on the G.W.R. are served by the company's railcars, which minimise the objection to extra stops.

* * * *

Switzerland via Harwich

Access to the Alps from England by way of Holland and Germany, or Belgium and Eastern France, is becoming increasingly popular. Although the night services by way of Harwich actually require a journey of about 24 hr. between London and the heart of Switzerland, departure from Liverpool Street is not until the late evening, and a full night's rest is obtained comfortably on the boats, after which the traveller has the choice of such luxury expresses as the Rheingold, if travelling *via* the Hook of Holland to Basle, with the glories of the Rhine as a scenic attraction for most of the distance from Cologne, or the Edelweiss Pullman, if travelling *via* Antwerp, which takes him through much of the beauty of the Ardennes on his way to the Alps. Furthermore, with the recent reductions, the fares for these journeys, even by the trains mentioned, are no greater than those of the more direct routes. There is also the service *via* Flushing, with day travel over the North Sea and night travel beyond; to such an extent is this growing in favour that on Saturdays during July and August an additional service is being run this year, leaving Liverpool Street at 3 p.m. On the Dutch side this will connect with a new Zeeland Express, leaving Flushing at 11.35 p.m., with sleeping and restaurant cars, for Cologne, Coblence, Basle, and Switzerland, reaching Basle by midday Sunday.

* * * *

British Locomotive Hillclimbing

Not many years ago comparisons were sometimes made between the uphill speeds of fast trains in this country and those on French railways, and not to the advantage of the former. In particular, the performances of Nord locomotives up the 1 in 125 ascents in both directions to Caffiers summit, between Calais and Boulogne, with heavy trains, have been cited as representing something quite exceptional in locomotive capacity. But with present-day British Pacific locomotives a hillclimbing standard of a very much more advanced order is being set up. We recently saw details of a southbound journey on the L.M.S.R. Midday Scot in which, from the dead start at Carlisle, which does not allow a "run" at the bank in question, one of the Pacifics, with a 17-coach train of 570 tons, attained 39 m.p.h. up the continuous 1 in 132 to Wreay, and maintained a steady 41 on the 7 miles at 1 in 125 between Clifton and Shap. With one of the L.N.E.R. "A3" Pacifics, and a 460-ton train, we have noted an acceleration from a 30 m.p.h. permanent way check up a 1 in 200 grade to 55 m.p.h., and no greater drop in speed than from 57 to 55 m.p.h. up 3 miles at 1 in 178. A recent feat of the L.N.E.R. Silver Jubilee express in covering the 15-mile rise from Tallington to Stoke summit with its normal 230-ton train at an average speed of 84·9 m.p.h., notwithstanding the inclinations of 1 in 200 and 1 in 178, represents an order of hillclimbing performance probably without a parallel in the world.

* * * *

Operating Signals by Vacuum Power

In an editorial note in our issue of August 7, 1936, we described a method of operating by spring power the distant signal used to repeat the starting signal at certain stations on the German State Railway. If the home signal is cleared first, this distant signal, of course, does not move, but power to operate it is stored in readiness in a spring, and is released by the operation of an electric lock when the starting signal—worked sometimes from another signal box—is cleared. Another method of attaining the same result has now been on trial for about 15 months at Rudolstadt, and is described by Herr Voigt in the *Zeitschrift für das gesamte Eisenbahn—Sicherungs—und Fernmeldewesen*. Its general principles are the same, but power is stored by means of a cylinder in which moves a specially constructed piston attached to the home signal operating mechanism; the cylinder itself is connected to the distant signal through an electric slot, or replacer, and controlled by the lock above mentioned. When the home signal is pulled off the piston is displaced, creating a vacuum above it; and on the withdrawal of the lock the cylinder descends and clears the distant. The working is said to be exceptionally smooth and quiet, and the vacuum capable of being maintained in readiness for a considerable time, if necessary.

A Railway and Village for Sale

A modern "deserted village," although there is no Oliver Goldsmith to muse over its mournful fate, is the Penine hamlet of Scar House, near Pateley Bridge, Yorkshire, which with its sole link with civilisation—the Nidd Valley Light Railway—came under the auctioneer's hammer a few days ago. The village and railway owe their existence to the Bradford Corporation's £2,000,000 reservoirs at Scar House and Angram. They enjoyed a useful life only during the period of construction of the works, and as soon as they were completed, the village, which once housed over a thousand people, was forsaken and the railway shortly afterwards closed. The sale catalogue included eight locomotives from twelve to forty years old; a quantity of four-wheeled carriages (chiefly from the old Metropolitan Railway); about 14 miles of permanent way; signalling apparatus, including a signal box, as well as the whole village comprising houses, shops, hostels, hospital and school, and a quantity of plant used in the construction of the reservoirs. The Nidd Valley Light Railway was a standard gauge line, owned by the Bradford Corporation, who obtained powers for its construction from the Light Railway Commissioners by an Order of March 1, 1904. It connected Pateley Bridge, where it joined the L.N.E.R. branch from Harrogate, with the villages of Wath, Ramsgill, and Lofthouse, and at each place there was a passenger station. This "public" section, 6 miles in length, was opened for all classes of traffic on September 11, 1907, and closed to the public on December 1, 1929. The remaining section from Lofthouse to Angram (4 miles), carried traffic only in connection with the reservoir works. The cost of the entire railway, excluding the value of the land, was about £40,000.

* * * *

Floodlighting of Marshalling Yards

Some useful figures relating to the floodlighting of railway marshalling yards are given in a recent issue of the *G.E.C. Journal*. In America, projector heights of 70 to 100 ft. are not uncommon, and projections of 1,000 to 2,000 ft. are claimed, but in this country 500-watt units placed about 40 ft. from the ground represent usual practice. The poles supporting the projectors are spaced 700 to 800 ft. apart along lines running longitudinally down the yard, and, except for the end poles in a line which carry one projector each, all the poles carry two projectors. These projectors have a beam angle of 28 to 30 deg. and each is set so that the core of its beam strikes the ground at or a little beyond the point midway between its own supporting pole and the next. To ensure that no deep shadows are cast between trucks lying on adjacent tracks, the longitudinal lines of projectors are not more than 50 ft. apart transversely. If 1,000-watt projectors are used, the longitudinal spacing is increased to 1,000-1,200 ft. To intercept light setting out in a direction above the horizontal, the projectors are fitted with reflecting vizors which direct this light downwards, thus illuminating areas in the immediate vicinity of the poles which would otherwise remain practically unilluminated. In hump yards all the projectors may be trained to send light in one direction.

* * * *

Invisible Streamlining

Efficient streamlining with the added advantage of free accessibility to all working parts is the ideal claimed for the recent treatment of one of the 4-6-0 four-cylinder simple locomotives of the French State Railways. This engine dates from about 25 years ago, but has been modernised by improved valve and exhaust arrangements. It works at a pressure of 203 lb. per sq. in. and its four cylinders, 17 in. by 25 in., drive 6 ft. 8 in. coupled wheels. The grate area is 24·5 sq. ft., and of the combined heating surface of 2,045 sq. ft., 581 sq. ft. are contributed by the superheater. As may be seen from the illustration on page 1209, the locomotive carries a system of deflectors; the foremost has a large vertical aperture in the middle through which, when the locomotive is moving, a stream of air passes. This current, which plays against and is directed by the succeeding deflectors, forms round the body of the locomotive an envelope or sheath of air which opposes the formation of eddies. When at speed, therefore, the locomotive may be said to be invisibly streamlined, at least in still air or a direct headwind. What happens in a side wind may be less certain. It is stated that wind tunnel tests at St. Cyr have shown that this type of streamlining, in comparison with the more orthodox treatment whereby the locomotive is cased in with sheet metal, has a 30 per cent. advantage in power economy when overcoming head-on air resistance. The locomotive tender is completely streamlined.

* * * *

The Retardation of Trains

Mr. W. S. Graff-Baker, Chief Mechanical Engineer (Railways), London Transport, in the course of the interesting paper he read on "The Retardation of Trains" at a meeting of the Institution of Locomotive Engineers, remarked that the amount of work a brake block has to do is not always appreciated. If a train is decelerating at a constant rate, the energy dissipated by a brake block is high at the beginning of the stop and low at the end, since the kinetic energy varies as the square of the speed, the energy corresponding to a reduction in speed of one mile an hour at the beginning of a stop being far greater than that corresponding to one mile an hour at the end of the stop. He gave as an example a train travelling at 40 m.p.h. to which the brakes were applied—$\frac{15}{16}$ of the energy would be dissipated between 40 and 10 m.p.h., and only $\frac{1}{16}$ left for the last 10 m.p.h. If a train weighing 250 tons has 70 wheels, each fitted with one brake block, and is braked at a rate of only 1 m.p.h. per sec. from a speed of 90 m.p.h., the horsepower dissipated for each brake block at the beginning of the stop is 90. Such figures give an idea of the wear on brake blocks and tyres.

* * * *

A New Locomotive Development

The Pennsylvania Railroad is at present engaged in developing what it claims will be the most powerful steam locomotive ever designed for passenger service. Although it will resemble to some extent the existing streamlined Pacific locomotive now in service on the Pennsylvania, it is to be capable of hauling a 14-car passenger train of 1,200 tons at 100 m.p.h. The new engine, which it is understood will be of the 4-4-4-6 type, will have four outside cylinders, each pair driving four coupled wheels. In view of the announcement that a committee of engineers of the Baldwin, American and Lima Locomotive Companies, co-operating with those of the Pennsylvania Railroad, is responsible for the design, after extensive studies of modern trends, it may be presumed that the locomotive will be a compound. From available data there seems to be little doubt that the locomotives which today are giving the best overall efficiency from every point of view are the Chapelon four-cylinder compounds as used on the French railways. When principles and details are respected, as Monsieur Chapelon has shown how they should be, the old objections to compounding lose all their force. The advent of this new Pennsylvania locomotive will be awaited with world-wide interest.

Colonel Mount's Annual Report

LT.-COLONEL A. H. L. MOUNT, Chief Inspecting Officer of railways, concludes his annual report with the following reassuring words: "Having regard to the foregoing information, the incidence of accident and casualty for 1936 shows that the high standard of safety on British railways was fully maintained." In accordance with our custom we will proceed to quote the principal items of information in the interesting and important document referred to. The day has, of course, long since gone by when it was necessary to demonstrate the wisdom of adopting the best appliances and methods known for ensuring safe working. Progressive railway managements are now everywhere convinced that successful operation is impossible on any other plan. The continued extension of the most modern types of signalling on the most heavily worked sections of line is more and more eliminating the human element, with its risk of mistakes, and although any one year may show a better or worse accident record than another, a broad interpretation of the question, derived from a consideration of all the facts over a term of years, warrants the belief that railway travelling is becoming progressively safer. There is no likelihood of its being permitted to do otherwise. Public opinion, unduly responsive to a railway accident for some reason, would not allow it, and the railways know their high standard of safety is probably their best business asset.

Taking train accidents, properly so called—the class which attracts public attention more particularly and includes collisions between trains; derailments; accidents due to failures of engines and rolling stock; fires in trains; and collisions with vehicles at level crossings—the report shows that only 3 passengers were killed thereby in 1936, compared with 13 in the previous year, for which the Welwyn accident accounted, but the number of passengers injured rose from 408 to 497. There were 17 railway and contractors' servants killed and 73 injured, against 7 killed and 81 injured in 1935, but for obvious reasons a relative value only can be placed on these figures. A narrow escape from an accident may hold a more serious lesson than an accident involving a regrettable list of casualties, for it may reveal some weakness in working with grave potentialities. The total casualties in train accidents, including "other persons"—mainly persons killed or injured through collisions between trains and road vehicles, or with gates at crossings, or persons travelling in business trains, such as Post Office employees; but excluding suicides and trespassers—were 37 killed and 606 injured, against 30 and 529 the year before, or 25 and 592 yearly average, 1930-1934; total train mileage was 447 millions, an increase of 12 millions, and 30·8 millions more than the 1930-1934 figure, an important factor to be borne in mind. Of the 17 servants killed in 1936, 8 met their death in a single accident, Barkston, and it is worthy of note that all the fatal and 28 of the non-fatal accidents among "other persons" occurred at level crossings. Although we must wish to see further progress achieved, these results cannot be regarded as unsatisfactory in any way, revealing as they do a remarkably high standard of safety.

Fourteen train accidents were the subject of inquiry by the inspecting officers (with 2 others presumably investigated by the assistant officers), 2 fewer than in 1935; and in 8 of these there was loss of life. The accident at Shrivenham probably attracted most attention, although only 1 passenger and 1 servant were killed, and it was due primarily to the failure of 2 experienced signalmen to notice that a goods train had become divided. The irregular working of signal box clocks came under notice, and the present report says: "the drawhook concerned was of wrought iron, 15 years old, and its failure was due to the poor shock resisting property of the material; tightening up of existing regulations was recommended in order to ensure that within an agreed period such a hook will not remain in service. Consideration by the Companies' and the Private Owners' Associations has resulted in agreement to eliminate entirely the welding of wagon drawgear, and also the repairing without welding of the 1923 drawgear." At Stourbridge Junction a signalman failed to notice that a goods train was still outside his box and wrongly accepted an auto train, the driver being killed in the collision. The goods train driver had rightly stopped at a signal in a doubtful position, reading over facing points. Another rather similar blunder on a signalman's part led to the Peterston collision, the effects of which were, however, not serious. Permissive working came under notice in the Barrow-on-Soar accident, when a train had not been cautioned and the tail lights of the one ahead were at first thought to be on an adjacent line. The extension of Rule 55 to such lines is under consideration.

The Barkston collision was most unfortunate. Two light engines ran into a ballast train, killing 8 employees; there was practically no doubt that the signals worked from a box not usually open at that hour were overlooked, and automatic train control alone would have prevented the accident. Signals were again overlooked in a collision at Rugby, and in the very unusual accident at Radstock, where, through enginemen losing their heads when a collision seemed imminent, a locomotive ran away, propelling some wagons. These became derailed 5½ miles further on, wrecking a signal box, but the locomotive did not stop until it was derailed 3 miles further, still by good fortune no train was approaching on the single line, which included 2 tunnels. Another unusual case was the fire in a train near Winchester. The cause could not be positively ascertained; it might have been a spark or an electric short-circuit, but the evidence inclined to the latter. Criticism was directed against certain constructional features of the rolling stock, electrical and mechanical; and desirable improvements were indicated. The derailment at Postland called attention to the necessity of greater care on track maintenance and the desirability of not running 4-wheeled vehicles at very high speeds, as did other derailments later. Since the period covered by the report another serious case has occurred and Colonel Mount has found it necessary to make very definite recommendations, including a speed limit of 60 m.p.h. for short wheelbase 4-wheeled stock. Two exceptional accidents were those at Willesden and Auchterarder; in the former, doors on a horsebox flew open, never having been fastened, and fouled a train, killing a passenger therein; at Auchterarder an inside locomotive connecting rod broke and pierced the boiler. The level crossing question was again raised by the Harpham accident, when a train ran a motorcar down and killed the two occupants. The gates were attended and supposed to be kept locked, but a padlock had been broken by someone never traced; there was delay in seeing to it and so the occupants of the car were able to let themselves through. A recommendation was made that after review of traffic conditions, up-to-date equipment should be substituted when that existing becomes due for renewal, and that, pending modernisation, locks should be fitted on all main gates operable by the public without concurrence of the railway staff. This is still under consideration.

Speaking of the methods available for preventing accidents, the report says that automatic train control should have prevented, or mitigated the effects of, three accidents inquired into, and might have been beneficial in 20 cases

not enquired into and unattended by casualties. Local track circuiting would have prevented the Stourbridge and Peterston accidents, but local conditions did not justify its installation. The present practice of increasing the number of local installations, such as train waiting track circuits, is considered to be fully justified. There were 54 buffer stop collisions in 1936, 10 more than in 1935; and 124 as against 131 persons were injured thereby. The calling-on arm figured in 31 train accidents, compared with 18 in 1935, and 43, as against 30, persons were injured. Equipment to confine "stop and proceed" working to defined emergencies, the report states, is being installed on the sections of line concerned, and for the electric lines in the London area carrying passenger trains only, for which the rule is authorised under all conditions; the use of more powerful tail lamps is also under consideration. It would, we feel, be a very good thing if better tail lights were to be considered for all trains. As Colonel Mount said in his report on the Welwyn accident, they are the "second line of defence" if a blunder is made, yet we cannot by any means regard them as always good enough for that important function.

Accidents to trains of every kind amounted to 908, against 733 in 1935; the average for the years 1930-1934 was 796. Accidents to, or failures of, rolling stock and permanent way came to 5,159, compared with 4,987 in 1935, or 5,772 for the 5 years in question. The failures of coupling apparatus totalled 4,854, against 4,696 the year before, but the increased traffic must be borne in mind. There were also more broken rails. The figures continue to prove that the chief weakness lies in the drawgear, but a remarkable improvement has been made in the last 10 years, for the annual average for 1920-1924 was 10,675.

Level crossings have already been referred to in connection with the Harpham accident. The report shows 52 killed and 41 injured, against 51 and 51 for 1935. There are about 4,560 public road crossings, all but 200 provided with gates and attended. Of the 27 cases involving casualty, 12 were due to lack of caution by pedestrians, 9 to the same fault in drivers of road vehicles, gatekeepers were at fault in 4 cases, trainmen and station staff each in 1. Casualties at public crossings compare favourably with the previous year. The report says that having regard to the growth of road traffic, statistics continue to justify the general conclusion that danger to the public using level crossings is not increasing but it is desirable to emphasise the difference between the occupation type of crossing and the public road type. The companies are engaged in a special investigation regarding the former.

Turning to accidents other than train accidents, we find 498 inquiries held, recommendations being made in 271 cases; in 220 instances the recommendations were adopted, in 28, not adopted and 23 are still under consideration. Other cases have, as usual, been dealt with by correspondence. In the movement accidents we find 62 passengers killed and 5,261 injured, against 84 and 4,517 in 1935. No fewer than 1,704 cases (7 of them fatal) were due to entering and leaving trains, and 2,732 to the opening and closing of carriage doors at stations. These figures have been rising since 1925, and we think it probable that the increased electric services, especially with compartment type trains, have much to do with it. The dangers are increased by the rapid acceleration, while at many stations the platforms are still no higher than they were 40 years ago and are much too low for entering a train at rest in comfort, let alone the foolhardy acts witnessed daily. The modernisation of many stations in this respect is long overdue, in our opinion. There was an increase in servants killed and injured, the figures being 195 and 2,680, against 165 and 2,436 for 1935. By far the greater proportion were genuine accidents, while want of caution of the injured person or some other accounted for about 27 per cent. It is satisfactory to note that improvement in casualties to men working on the line is being maintained, but not to see that lookout men are more in fault than formerly, the bad case at Preston putting the figures up. There are still unfortunately many men who fail to take full advantage of a warning and stand well clear. Colonel Mount observes: "While the education of gangers and others responsible for the appointment of look-out men, and the care in selecting suitable men for look-out duties, should not be relaxed, action is needed with a view to encouraging better appreciation of the responsibilities of the men themselves, to act correctly when warning is received, and at other times when working upon the permanent way." Casualties in coupling and uncoupling are lower, but all resulted from failure to observe Rule 12(*c*), forbidding going between vehicles with gangways when they are in motion. The report says there is "little doubt the Rule is not receiving the attention it deserves, either by the men themselves or the supervisory staff." There are many other figures in the report touching non-movement accidents of various kinds, comprising 13,901 casualties, 99·1 per cent. being really industrial accidents of a more or less non-preventable character. Suicides and trespassers present no great interest, save that live rail casualties are becoming more prominent. We reproduce

Particulars	Annual Average, 1920–24		Annual Average, 1925–29		Annual Average, 1930–34		Year 1935		Year 1936	
Accidents to trains ..	1,009		941		796		733		908	
Accidents to or failure of rolling stock or permanent way	11,153		9,141		5,772		4,987		5,159	
Casualties :—	*K.*	*I.*	*K.*	*I.*	*K.*	*I.*	*K.*	*I.*	*K.*	*I.*
Passenger	92	2,577	91	3,733	74	4,394	97	4,925	65	5,758
Servants	248	3,518	210	3,267	183	2,592	172	2,517	212	2,753
Other persons	67	136	67	158	51	146	66	121	58	127
Totals	407	6,231	368	7,158	308	7,132	335	7,563	335	8,638
Passenger journeys, including estimates of those of season ticket holders (millions)	1,848		1,661		1,612		1,697·0		1,745·0	
Freight tonnage (millions)	322		320		288		290		301	
Net ton-miles (millions) ..	17,457		17,562		16,060		16,411		17,438	
Companies' servants employed (March)	707,574		680,197		603,621		582,091		586,935	
Passenger and freight train mileage (millions)	368·7		401·3		416·2		435·0		447·0	
All casualties per million train miles :—										
Killed	1·1		0·9		0·7		0·8		0·7	
Injured	17		18		17		17		19	

as usual the table with which the report concludes, showing the total casualties from all movement on rail, excluding trespassers and suicides, in 1935 and 1936, and the averages for the three five-yearly periods.

Total fatalities are the same as in 1935, but non-fatal casualties have increased, in many cases due to want of personal care, and Colonel Mount remarks that " propaganda in this respect appears to afford the only means by which material improvement will be effected." The careful passenger, at all events, can continue to congratulate himself. His liability in train accidents was 1 death for 582 millions carried, or 1 injured person in about 3·5 millions.

* * * *

Sir Eric Geddes

THE untimely death at the age of 61 of Sir Eric Geddes has removed a remarkable figure from British public life, and in particular from the sphere of transport. He held many important public offices, and played no small part in directing this country's fortunes during the crisis of war and reconstruction, but his career will, we believe, be chiefly identified with the creation of an entirely new era in British railway history.

His personality first emerged into prominence during the war years, when indeed, under the influence of the popular press, a kind of myth was created, in which Sir Eric became a prototype of the " superman " of which we heard so much in those days. Despite popular exaggeration, however, there is no question, to anyone who knew him, that Sir Eric's character and personality were of an outstanding and peculiarly forceful type. As his career in the war amply demonstrated, he was the kind of man who " got things done "; he could impress his personality on others, themselves men of ability; he was a supreme organiser, could choose able lieutenants, give them full scope, and get the very best out of them. Undoubtedly these abilities were greatly aided by war and post-war conditions, but his earlier career is proof that they were always there. His adventurous spirit was shown by his abandonment of a military career at the age of 17 to go to the United States, where, and subsequently in India, he made his own way, but his ability and force of character are perhaps best exemplified by his career on the North Eastern Railway.

Contrary to the belief that Sir George Gibb sent for him, he obtained a minor post as Claims Agent in 1904 on that railway only with some difficulty; but once there, although regarded at first as an interloper, he made such progress that, in the short space of six years he became successively Commercial Agent, Deputy Goods Manager, Chief Goods Manager, and Deputy General Manager with a reversion to the General Managership, an achievement which to every railwayman is conclusive evidence of outstanding ability. So, in the wider arena of public life, when the crisis of war came, he was chosen by Mr. Lloyd George, first to organise the Ministry of Munitions, and then to reorganise, or rather to create the transportation system in France, and in all theatres of war. Even when transferred to the Admiralty, he was still primarily concerned with sea transport, and after the war he was obviously singled out to create the new unified system of transport and communications under State direction or control upon which the Government had then resolved. Thus he became first Minister of Transport. But, when the political system changed, he was equally ruthless and efficient in cutting down all the growth of Government services, and most drastically of all, his own creation, as Chairman of the famous " Axe " Committee.

This ruthless efficiency and readiness to make a clean cut with any former phase of activity was indeed a distinguishing quality, and one that enabled him to take up one great task after another without handicap from the past. In other spheres and conditions, he might have been a Mussolini or a Hitler, but in the more ordered English scene, the epithet " superman " was not undeserved. In the railway world, at least, he was a greater Sir Henry Thornton, with the same tendency to elaborate organisation and optimism; and in the field of transport and industry he displayed equally brilliant qualities as Chairman of the Dunlop Rubber and allied companies, and especially of Imperial Airways, an organisation of incalculable value to the future of Empire communications which owes much to the stamp of his organising genius. It is well known that he has been ably seconded in all his undertakings by Sir George Beharrell, whom he took with him from the North Eastern, and who was almost his *alter ego* in all his subsequent enterprises.

Whilst it may be true that, in the post-war megalomania, he shared the politician's partiality for seeing glowing visions without too strictly counting the cost, he at least knew clearly what he wanted, and had the personal ability to carry out schemes perhaps too grandiose for ordinary men. His unremitting devotion to the claims of onerous public duties during the war and post-war years was all the more remarkable to those who knew the sad domestic tragedy arising from his wife's illness, and reflects additional honour on his character. It is to be feared that his untiring energies throughout a strenuous career at last impaired his health, and thus brought about the death at a comparatively early age of one who, though he had many great achievements to his credit, could ill be spared by his country, and in particular by the transport and industrial community of which he was an outstanding figure.

* * * *

Locomotive Boiler Maintenance

LOCOMOTIVE boiler maintenance really divides itself into two sections: scaling, which can be dealt with to a large degree by known methods, and corrosion, which leads to serious depreciation of the boiler. In the latter connection, we note that Mr. T. H. Sanders, during the discussion of the paper on " Locomotive Feedwater Treatment " which Mr. J. S. Hancock read before a meeting of the Institution of Locomotive Engineers, remarked that engineers of today appear to have forgotten the material known as " best Yorkshire iron." In past days, when boilers and fireboxes were made of this material, corrosion was a very slow process owing to the purity of the iron. Boiler pressures were, of course, then very much lower, and the increase in steam pressures and boiler dimensions has practically forced engineers to use steel, and very often special steels, in order that weight may be saved by reducing the thickness of plates. Then again, as a result of the limiting sizes of best Yorkshire iron plates, the manufacture of such has ceased and it would today be considered a very extraordinary proceeding to order them for the construction of modern boilers. The lower the carbon content and higher the general purity of the material, the less tendency there is towards corrosion. In the earlier days of the use of steel, the carbon was very low, about 0·10 per cent., and the tensile strength of the plates about 24 tons. Now, however, with increasing sizes and pressures, the tensile strength of the plates is being raised to 40 tons, and a study of the comparative effects of corrosion on these two steel qualities in locomotive service would be very valuable.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Glasgow Central Underground

Glasgow

June 17, 1937

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—May I put in a layman's plea for the electrification of the L.M.S.R. Glasgow Central underground line? Few would deny the foulness of its tunnels and stations, and few would deny their Stygian and forlorn aspect. Now, I have heard rumours that on this very account, possibilities of substituting diesel-electric for steam traction have, and perhaps are being considered. I have travelled through the Boulevardebane tunnels in Copenhagen behind a diesel, and the exhalations of the locomotive, though less thick than those of a steamer, most undoubtedly stank.

No doubt I shall be told that the traffic on the Glasgow Central line would not allow for the expense of electrification; but with, say, a frequent service operated by electric train between Maryhill and Rutherglen, I really believe that the Glasgow Central would wean a very considerable proportion of passengers from buses and from the ubiquitous Glasgow tram. The other day I endured a long and bumpy ride in a bus from near Kirklee to the middle of Glasgow, for the simple reason that there was not an underground train for over an hour. Plenty of people are doing the same thing every day.

This note is without prejudice; I am interested neither economically nor enthusiastically in the " juice-wagon."

Yours faithfully,

JINGLING GEORDIE

The London—Sheffield Train Service

London, June 15

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—I am indebted to Mr. Charlewood for his interesting and informative letter. I quite agree that there is need for a new early morning London—Sheffield express for the benefit of business men. This has been a long standing need and it is strange that while Sheffield business men are so well provided for by means of the 7.15 a.m. to St. Pancras, 7.30 a.m. to Marylebone and 8.20 a.m. to King's Cross, those in London are almost entirely neglected. Mr. Charlewood might have mentioned however that it is possible to reach Sheffield in 3 hr. 21 min. by changing at Retford from the 7.25 a.m. from King's Cross. As regards duplicated services, whether these were established before or after the war makes no difference to the convenience of the traveller, whose return ticket, it might be remembered, is now interavailable. Incidentally I think the 4.55 p.m. from Marylebone might, as now run, be termed a post-war innovation. I do not think I fell into error in mentioning the increased loads of today. On the Great Central this is very true, the standard five-coach sets of pre-war days having given place to six, seven and eight vehicles, while at week-ends on some trains anything up to eleven coaches may be seen. On the Midland the introduction of through coaches to and from West Riding towns, via Thornhill, is responsible among other things for the increased loads of today. As regards the increased locomotive power now available, it must not be forgotten what a large amount of double heading there used to be on the Midland, while today on the Great Central " Directors," " Sandringhams " and " Atlantics " take turns on the same expresses with little difference in performance. Much as the Midland timetable needs improvement the Great Central in my opinion is even worse off. True, conditions are not worse than in pre-war days, but they have remained static at the very time when every opportunity of improvement should be taken, as it appears that this route is gaining popularity and beginning to carry something like the passenger traffic for which it was built. Many of the expresses departing at important hours are very much slower than they need be, due to the respect paid to such places as Finmere, Woodford, Brackley, and Lutterworth. When trains are run in duplicate, instead of accelerating one, these stops are simply duplicated, as with the 11.7 a.m. and 11.20 a.m. from Sheffield (Saturdays in summer). The best example of this is on Sundays, when *three* up expresses stop at the little town of Lutterworth in the space of 46 min.! Another point to be remedied is the gaps in the service as between 12.15 p.m. and 3.20 p.m. down and 11.20 a.m. and 3.30 p.m. up. The London—Sheffield service has evolved piecemeal and the timetable is the result of the patching up of years. Apart from an experiment by the Midland some years ago no attempt has been made to introduce on these routes a system of fixed interval departure hours, such as has contributed substantially to the popularity of the two-hourly Leicester and Manchester trains from St. Pancras. The Sheffield—Marylebone timetable can, without any radical changes, be re-arranged to give a fixed interval service, viz:—7.30, 9.30, 11.30 a.m. and 1.30, 3.30, 5.30, 6.30 p.m. This is an amenity which could also be enjoyed by Nottingham and Leicester at 20 and 50 minutes respectively past the following hours.

Yours, &c.,

" SHEFFIELD "

Railway Jugglery

56, St. Mary's Mansions,
Paddington

June 15

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—Your paragraph on " Railway Jugglery " (in the Scrap Heap of June 4) might have instanced a further complication—that the 1.28 from Sheffield is really a through train from York to St. Pancras, proceeding from Chesterfield, via Nottingham, at 2.11. While this train is at Chesterfield (from 1.50 to 2.11), the 12.55 from Leeds (via Eckington) to St. Pancras calls, at 2.0 to 2.7, and the engine and leading vehicle of each train are changed over from one to the other—Leeds passengers thus securing a " through carriage " to Nottingham, and Sheffield passengers getting a " through " arrival at London on the faster Leeds train. The 12.42 from Leeds to the West of England comes through Chesterfield after these trains, and is quite independent of them, save that it has attached a Bristol carriage off the York train.

But these movements are the post-war version of a much more puzzling pre-war arrangement. In those days there came, first, a through train from Bradford (Exchange), via Thornhill, to St. Pancras, which ran into Sheffield and proceeded via Nottingham. At Rotherham it detached two London vehicles, which were re-attached there to the following train, the 1 p.m. from Leeds. Then the 1 p.m. from Leeds was itself split at Rotherham, the front portion (for the West of England) going into Sheffield and attaching there in rear the Bradford (Exchange) to London (via Nottingham) vehicles, after which it was divided again at Chesterfield—the front portion (from Leeds) for Derby and Bristol and the rear (from the Thornhill line) for London via Nottingham. But in the meantime the London vehicles of the 1 p.m. from Leeds, after attaching the London " direct " portion off the Thornhill train at Rotherham, had, on a non-stop run from Rotherham to St. Pancras, passed Chesterfield (via Eckington) before the arrival of the combined Bristol and London train from Sheffield. This arrangement, though giving Sheffield passengers no means of access to the first London train, was very much more bewildering to passengers than anything in the timetable today, for the 1 p.m. from Leeds conveyed also, at one period, a London vehicle routed via Nottingham, which became, of course, the rear vehicle after the first division, at Rotherham, and the front vehicle after the second, at Chesterfield.

Yours faithfully,

R. E. CHARLEWOOD

PUBLICATIONS RECEIVED

In den Balkan (In the Balkans). By S. A. Reitsma, editor of *Spoor- en Tramwegen*, from which the text is reprinted. 126 pp., 6¼ in. × 9½ in.; 138 photographs, 5 maps, and a diagram. Published by Moorman at The Hague, 1937. Not priced. Also by the same author, **Dwars door Albanië** (Through the Heart of Albania). 27 pp., 6¼ in. × 9½ in.; 2 photographs and map. Reprinted from the *Haagsch Maandblad*, April-May, 1937. Published by A. W. Sijthoff, Leiden. Not priced.—Whenever Mr. Reitsma makes a journey, especially one to parts few of us have an opportunity of visiting, almost invariably he places some account of his wanderings on record, written in such a manner as to charm us as we read and almost make us feel we have seen the different places ourselves. The first brochure is the story of a lengthy tour through Jugoslavia, Montenegro and Albania, including descriptions of the towns and scenery, travellers' experiences, and interesting comments and information on racial, economic, and political topics. There is an instructive chapter on the narrow-gauge railway system of Jugoslavia, with statistical details. The second publication has a particular interest for Dutch readers, as it deals with the work of a Dutch military officer, Lt.-Col. L. W. J. K. Thomson, who was a friend of the author and, with other Netherlands officers, was engaged in organising the Albanian *gendarmerie* in 1913-1914, when the German Prince of Wied governed the principality. The latter was driven out by an insurrection and Colonel Thomson lost his life at Durazzo on June 15, 1914.

How to See England. By Edmund Vale. London: Methuen & Co. Ltd., 36, Essex Street, Strand, W.C.2. 7½ in. × 5 in. × 1 × ⅛ in. 299 pp. Illustrated. Price 7s. 6d. net.—Travel books are of many kinds; this is the kind that tells you what to see and how to see it. When writing on these lines, the author has to look out for pitfalls which lead him into becoming a mere guide-book compiler. Mr. Vale really teaches you something about the natural, and above all the architectural heritage of England and Wales, and at the same time he makes you want to see the places with him. "How to see England" is one of those rare things, a book tremendously informative without being stodgy, a book which is a guide without being a "guide book" in the accepted sense of the term. The author is a true teacher, yet he never gives the reader the impression of being a pedagogue. His knowledge of English and Welsh architecture is undoubtedly profound, and when he strikes an occasional arbitrary note over the intricacies of early British history, we can only bow to his extraordinarily wide scope in this direction. A study of any country's domestic and ecclesiastical architecture loses half its savour when unaccompanied by a simultaneous study of that country's regional physical geography. In this respect again, Mr. Vale errs not at all, for his knowledge of English natural history seems always to equal his knowledge of architecture. The two are inextricably bound together. Imagine a stone Cotswold village transplanted to the Weald, or the town of Rye suddenly set down among the Cumberland Fells. There are very few slips, considering the generous attention which the author gives to the whole of England and Wales. Oast houses in Kent, for instance, though sometimes of wood, are usually built of brick. Mr. Vale's study of people and languages is well informed and sympathetic; his explanation of Welsh phonetics on page 42 is really delicious.

Chapter XII ("Railway Travel and Accommodation"), though short, sums up the peculiarities, and even the charms of English railway travel most pleasantly. Mr. Vale gently deplores the way in which present day travellers neglect what all sorts of people, from Samuel Johnson to Robert Louis Stevenson and Aldous Huxley, have found so fascinating, the journey itself. "A hundred years hence," he writes, "people will be wishing themselves back in the 'romantic days of steam-engine travel'." Naturally he judges the future by modern tendencies, though for all we know aircraft may be propelled by steam in 2037.

The book finishes with a list of regional novelists whose united works cover the whole of England, Wales and the Isle of Man, for example: Westmorland and Cumberland: Hugh Walpole, Constance Holme; Nottingham: D. H. Lawrence; Potteries: Arnold Bennett (he might have added H. G. Wells), and so on. Taking this book on the whole, Mr. Vale has succeeded where a good many authors would have failed miserably, in making a really informative work delightful to its readers.

Signalling (from) Waterloo to Hampton Court Junction, Southern Railway. Issued by the Westinghouse Brake & Signal Co. Ltd., 82, York Road, London, N.1. 28 pp. 11 in. × 8¾ in. 28 half-tones, 3 diagrams, and 2 folding plates, gilt-lettered cover.—This well-produced booklet gives a complete account of the important signalling installations carried out last year by the Southern Railway between Waterloo terminus and Hampton Court Junction, on the Western Section main line, as described in THE RAILWAY GAZETTE for May 29 and November 13, 1936. It includes as folding plates the two signal diagrams then issued, from which the magnitude of the work can be appreciated. The signalling portion of the equipment was supplied by the Westinghouse Brake & Signal Co. Ltd. The new Waterloo signal box, with three electric frames arranged as three sides of a square, is illustrated by a fine double-page view. No one can read this account of one of the most important signal installations in this, or any other, country without realising what a transformation in the handling of heavy suburban traffic has been effected by the accumulated experience in power signalling of the last 20 years.

Carbide Alloy Tools.—Samuel Osborn & Co. Ltd., of Clyde Steel Works, Sheffield, sends a catalogue of Osbornite tips and tipped tools. Osbornite is a carbide alloy which is available in five grades, thereby having a wide field of application. Together with the sizes and prices of tools and tips for turning, recessing, boring, and other workshop operations, this catalogue offers practical advice on tipping, grinding, and general use of Osbornite tools.

Popular Holiday Tours.—We have received an illustrated booklet and folders from the American Express Co., Inc., setting out arrangements for popular holiday tours in Great Britain and on the Continent. Among the Continental holidays offered may be mentioned all-in air tours to Switzerland by Imperial Airways and Swissair services. Very cheap facilities are available for visitors from London to the Paris Exhibition. A week-end (4 days) costs no more than £4 13s. inclusive of travelling and hotel expenses.

Netherlands Railways Postcards.—Set of 10 coloured postcards, 5¾ in. × 4¼ in.—Of this fine set of postcards sent to us by the Publicity Department of the Netherlands Railways, Utrecht, Holland, six show exterior and interior views of diesel-electric and electrically-operated trains placed in service within the past two or three years, and the remainder are views of four of the principal types of locomotives used on the system. The artistic standard of these coloured illustrations is very good and their clarity of outline is specially noticeable. The virulent colourings often associated with publications of this type have been avoided, and the Netherlands Railways are to be congratulated, both on the production of these postcards, and on the evidence they give of the colour treatment chosen for the rolling-stock of the system.

Southampton Docks, 1937. The Southern Railway Company. 9¾ in. × 7¼ in. 132 pp. Fully illustrated. Folding maps. Price 6d. net.—This handbook of rates, dues, charges and general information, applying to Southampton Docks, appears this year in a completely new form, with many innovations. An enormous amount of interesting as well as informative matter has been collected in this well illustrated publication. Within comparatively recent years, Southampton has become established as one of the foremost commercial seaports of Britain. The facilities and equipment at the docks are among the finest in the world. Southampton can claim the title of Britain's Premier Passenger Port and has established itself as the fourth port in respect of the value of freight traffic dealt with.

THE SCRAP HEAP

Answer to Railway Problem No. 11

5/6 of the way down. P. walks 1/50 way down stationary escalator in 1 sec. and 1/300 down ascending escalator in 1 sec. ∴ escalator does 1/50 − 1/300 = 1/60 whole way in 1 sec. P. ascends 1/50 − 1/60 = 1/300 descending escalator in 1 sec. Mrs. P. descends 1/60 = 5/300 in 1 sec. ∴ together they do 1/50 in 1 sec. and the whole distance in 50 sec. In 50 sec. P. ascends 50/300 = 1/6.

* * *

Amusing answers are received sometimes by the Interstate Commerce Commission in the U.S.A. from the small Class 2 railways in the mid-west. Replying to the official question, " Have you had any collisions? " the President of one 5-mile railroad is reported to have scrawled over the form, " How the hell can we have collisions when we have only one engine? "

* * *

TRAINS BY TELEPHONE

Those who frequently have the misfortune to miss trains through oversleeping, or who cannot rest easily the night before catching an early morning train, may perhaps have a remedy if the service now being tried experimentally at Sterling, Ill., U.S.A., proves successful. A patron of the Chicago & Northwestern Railroad who wishes to catch the 6.17 a.m. train from that town may telephone the station agent the night before and then retire to bed with an untroubled mind knowing that he will be called by phone just one hour before the train arrives, whether it is late or not. If successful the service may be extended to other cities.

* * *

THROWING OUT THE THROTTLE

There is nothing like telling a really good story. So thought a Sunday contemporary in giving its account of the L.M.S. freight train which recently started away driverless from Wigston towards Market Harborough, according to a cutting which has reached us from Mr. F. C. R. Daiton. " If the train had gone over the rise beyond the junction," says our contemporary, " it would have gathered speed down the incline and raced into Market Harborough at 90 m.p.h., and disaster would have been inevitable." Passenger trains in the best circumstances never exceed 80 m.p.h. here, so that the freight train's 90 would have made matters much worse. " The driverless engine threaded its way "—with quite uncanny precision—" for eight miles through the important junction at Wigston and went on down the main London line and through Great Glen station. At Kibworth the runaway slowed down. The signalman raced along beside the driver's cab, gripped the footplate, and scrambled aboard. For a moment he was bewildered by the strange array of gauges, taps, and valves in front of him. At last he recognised the throttle and the powerful brakes, threw them out, and the train groaned to a halt." We do hope that someone recovered the throttle and the powerful brakes later on; it would be a pity to have left such useful articles to rust at the line side.

* * *

WHAT U.S.A. RAILWAYS DO IN AN HOUR

Source: Bureau of Railway Economics of the Association of American Railroads. (Based on statistics of Class I railway operations in 1936. *Figures represent averages.)*

In an hour the railways earn $461,377 from their transportation operations.

In an hour the railways spend $333,727 in operating expenses.

In an hour the railways pay $210,439 in wages. (More than nine-tenths of this total is included in operating expenses.)

In an hour the railways pay $36,398 in taxes to national, state, and local governments.

In an hour 4,106 cars are loaded with revenue freight on the railways' lines.

In an hour 55,801 passengers board the railways' trains.

* * *

The last survivor among the passengers who rode behind the *De Witt Clinton* on its first historic trip on the Albany & Schenectady Railroad on August 9, 1831, is reported to have been Mrs. Fannie L. Bailey, who died at Albany a few years ago aged 104.

* * *

WINDOW STRAPS

The Dublin *Evening Mail* of June 5 published a paragraph on railway carriage leather window straps, pointing out that there is not the demand for these straps as there was in the days of the cut-throat razor, when they made excellent razor strops. The story is told of a young man who travelled light, with his shaving tackle in his pocket. As the train jogged along he thought he might employ his time profitably stropping his razor. He pulled out his treasured bit of steel and began vigorously to slap it up and down the strap. Something made him look round at the only other occupant of the carriage. The young man found his fellow traveller staring hard so that—as he said later—" I glared back at him, fierce like, and then gets on with my stropping; it had nothing to do with him." At the next station the other passenger left the carriage, and apparently said something to the guard. The guard looked into the carriage and asked the youth what he was going to do with the razor he was still flourishing in his hand. " Now, what's that to do with you," said the youth, " I'm only giving it a stropping." With that the guard went away grinning, leaving him slightly mystified. When telling the story later he still could not understand why the other traveller had left the carriage so hurriedly and sent the guard along. The combination of his glare and the sight of the razor apparently had been too much for the other passenger's nerves.

* * *

WHERE L.M.S.R. HORSES RECUPERATE

Hundreds of cases are dealt with every year by the three L.M.S.R. sanatoria for horses working in the London area, at Willesden and Kentish Town. " Horses," declares Mr. H. A. Turner, the L.M.S.R. Horse Superintendent for London, " are just as liable to illness as human beings, no matter how well you look after them. Chest complaints are the most frequent, although there are also a large number of cases of lameness, influenza, pleurisy and other ills common to mankind. Animals are also admitted which, though suffering from no specific complaint, are run down and considered sufficiently ' off colour ' as to be unable to discharge their job with the maximum amount of efficiency. These horses have a little ' holiday ' varying in length from a month to three months, and, in severe cases, the treatment also includes, in the summer, a certain time ' on grass.' "

" Horses which have been in the sanatoria seldom forget the good time they have had there. If any of them happen to be passing when back at work again, the carters invariably have a difficult job to prevent them from stopping or making their way inside the gates. One horse we once had to deal with was a regular old dodger. On making my periodical examinations I would look at the animal, which was perfectly fit, and observe, ' You are sound enough to go back to work.' This old soldier had apparently a quick ear, because ten minutes later he would be found nodding his head pathetically and pretending lameness. Even when he was certified ' fit ' and sent out, he would rather sit down in the road than work."

* * *

As long as there are plenty of passengers with plenty of cream cans and buckets and farmers' wells don't run dry, trains of the Irondale, Bancroft, and Ottawa line will make the grade all right.

They mightn't always be on schedule but they get there, at least they did Sunday, about six hours overdue on a memorable run from Lindsay to Bancroft.

When the train reached a point about 45 miles north of Lindsay the engine spluttered and quit. The passengers were told: " All the water from the boiler has been lost."

Jovially, passengers grabbed cream cans, buckets, and other improvised water-carrying devices. The train managed to struggle along for a couple of miles but it quit cold again.

The passengers flocked to a farmer's well and pumped it dry. Still there wasn't enough water and word was sent back to Lindsay for a second engine.—*From " The Albertan."*

OVERSEAS RAILWAY AFFAIRS

(From our special correspondents)

IRISH FREE STATE

Broadcast of Railway Work

A broadcast was arranged from the Dublin broadcasting studio on Thursday, May 13, describing various phases in the working of the G.S.R. The speakers included Mr. Plumer, the Assistant to the Chief Engineer; Mr. W. P. Murphy, Chief Staff Clerk, Traffic Manager's Office; the foremen of different carriage and wagon shops at Inchicore; drivers; a ticket inspector, a signalman; and an inspector from the North Wall goods depot.

Mr. Plumer explained the work of the Permanent Way Department, and incidentally mentioned that the Great Southern Railways had been the pioneers of the relaying train, which was initiated by Mr. Bretland, former Chief Engineer. He also explained the work of the weed-destroying plant which superseded hand weeding.

The foremen from Inchicore outlined the work entailed in the building and repairing of engines, carriages and wagons, and the use of the most modern machinery; also the progress made in the types of engines and vehicles during the past 40 years. Engine drivers, too, explained their duties, all of this information being given in the form of interviews with the various foremen and drivers, the conversations being accompanied by a "background" of the actual sounds reproduced from records made at the shops and locomotive depots.

The Traffic Department

Mr. Murphy dealt with the Traffic Department and its earning capacity. He described how a passenger ticket was issued and completely dealt with, bringing in a ticket inspector to explain what ticket checkers had to do, their difficulties with the public and the necessity for courtesy. Mr. Murphy continued with a description of the work entailed in dealing with goods traffic, the collection of traffic, loading at the departure stations, unloading, delivery to consignees at the station or by the company's railhead services, as well as explaining fully the clerical side of the work, not forgetting the shunting and the running of the trains.

Description of Work at North Wall

The inspector from North Wall, which is, of course, both a port and railway depot, described the work with which he had to contend, including the unloading from ships or transfer to them of the traffic to and from the railway, as well as the ordinary reception and delivery of traffic, and explained the improved facilities afforded to the public and in working within the last 40 years.

Mr. Murphy concluded by drawing attention to the service rendered in bringing morning newspapers to the breakfast table at places 150 miles distant from the publication centre, and to the delivery of goods traffic at equal distances on the morning after despatch.

A signalman's impressions were also given, and the announcer concluded by stating that not only were the railways the arteries through which flows the commercial blood of the nation, but were also a barometer of national prosperity, pointing out that their operation required an organisation altogether exceptional in commercial skill, acquired through years of study and experience, coupled with the foresight necessary to expand and deal with present-day needs.

ARGENTINA

Record Export Figures

An increase of 600 per cent. in wheat shipments, huge exports of other classes of grain and linseed, and boom prices for wheat, maize, barley, wool, hides, and other products all contributed to make the month of March the record month for exports in Argentine history. The previous record value was registered in January last, but it was exceeded by over a million pesos in March, although the tonnage shipped was smaller. Compared with March, 1936, both tonnage and value were higher by, approximately, 100 per cent.

The sensational rise in wheat shipments and prices accounts for a considerable proportion of this increase, wheat exports having risen from 359,312 tons in the first quarter of 1936 to 2,514,761 tons during the corresponding period of this year, an increase of 2,155,449 tons. Similarly the value has risen from $36,152,455 paper in 1936 to $293,949,068 paper, an increase of $257,796,613. The following comparative table shows the tonnage of grain and linseed shipped during the first quarters of 1936 and 1937, and the average price per ton for each period :—

	Quantity in tons		Average prices (per ton)	
	1937	1936	1937	1936
			$	$
Wheat	2,514,761	359,312	116·89	100·62
Maize	2,349,286	1,781,646	62·51	44·11
Linseed	683,991	454,474	144·77	140·54
Oats ...	163,514	44,088	61·24	59·63
Barley	186,032	68,535	83·20	51·49

Railway Pension Board Called to Order

Mention has been made once or twice in these columns of the unreasonable attitude occasionally taken up by the National Railway Pension Board with respect to the rights of pensioners, as well as a tendency on the part of the Board to dispute or ignore the ruling of the courts in regard to legitimate pension claims. Recently the recipient of a pension asked the board to pay her also the pension due to her sister, who was living abroad. This the board refused to do, but both the Federal Court and the Supreme Court decided in favour of the plaintiff. The Pension Board, however, still refused to comply, on the grounds that as the beneficiary in question had attained her majority at the time the pension was claimed, nothing was due to her from the fund. The case was then taken to the Appeal Court, which ruled that the board must pay the pension from the date of the death of the beneficiary's father until that on which she came of full age, adding a rider to the effect that in future the Pension Board must comply with judicial decisions without questioning them in any way.

Terminal Grain Elevators: Contracts Awarded

Contracts for the erection of the first group of terminal grain elevators at the New Port (Buenos Aires), Quequen, and Ingeniero White (B.A.G.S.R.), and Rosario, and Villa Constitución (C.A.R.), at a total cost of $37,148,366 paper (THE RAILWAY GAZETTE of April 16) have been awarded by the Ministry of Agriculture. These elevators are the first six units in the projected chain of State-owned elevators, the cost of which it is proposed to defray out of the exchange profits fund. Work is to begin within two months of the signing of the respective contracts, for which a time limit of 15 days has been fixed; sixteen firms submitted tenders. The contracts are divided into two groups, one for the buildings, and the other for the machinery and installations, the total cost of each elevator being as follows :—

	$, paper
Buenos Aires	10,854,896
Quequen	4,712,309
Ingeniero White	2,693,747
Rosario (North)	4,694,489
,, (South)	7,823,192
Villa Constitución	6,369,733
Total	37,148,366

The British firm of Henry Simon Limited, was successful in obtaining several of the machinery contracts, to a total value of $10,911,116 paper (approximately equivalent to £669,400 sterling).

Buenos Aires Association of the Institution of Civil Engineers

Mr. M. F. Ryan, C.B.E., M.Inst.C.E., (General Manager, Buenos Ayres & Pacific Railway) Chairman of the Association, delivered the inaugural address of the session on April 22, the subject dealt with being "Railway Budgeting." After referring to Mr. (now Sir) W. V. Wood's paper in London on "Railway Finance," Mr. Ryan described the methods of budgeting now in use on the B.A.P.R. from the standpoint of both receipts and expenditure. He indicated the different problems involved in each case, explaining how earlier erroneous forecasts were corrected and unforeseen contingencies provided for as far as possible,

and concluded with some observations on the psychological aspects of railway budgeting as it affects the working of the different departments, and the advantages to be derived from the adoption of the practice on a sound actuarial basis. The address was illustrated with numerous diagrams, and at the conclusion, Mr. Ryan was accorded a hearty vote of thanks, which was proposed by Mr. F. L. Creswell, M.C., M.Inst.C.E., Chief Engineer, B.A.G.S. and B.A.W. Railways.

Visit to Mar del Plata

On April 29 a party of members of the association travelled over the B.A.G.S.R. to Mar del Plata, to inspect the third section of the road which is being constructed between that city and Dolores, running parallel for about 46 km. with the railway, and presenting features of special engineering interest. Afterwards the party visited the Ceramica del Plata quarry at Chapadmalal, which supplies the stone used in the work, and then travelled to Mar del Plata, where a meeting was held at which papers on "The Use of Pre-Cast Concrete Slab Units for Small Bridges and Culvert Spans," by Mr. D. G. MacCormack, B.Sc., M.Inst.C.E., Assistant Chief Engineer, Central Uruguay Railway; and on "Culvert and Bridge Improvements on the Argentine North Eastern Railway," by Mr. H. F. Molony, B.A., M.A.I., A.M.Inst.C.E., Entre Rios & Argentine N.E. Railways, were read and discussed.

VICTORIA

Notable 10th and 20th Anniversaries

April 25, 1937, was a particularly significant date for over 200 Victorian railwaymen, in that it marked the 20th anniversary of the torpedoing and sinking of the ss. *Ballarat*, in which they, as belonging to the 1st Railway Operating Company, were being carried to England *en route* for France. A German submarine torpedoed the troopship 75 miles from Land's End, but every man was saved either from the ship, from lifeboats or from improvised rafts by other vessels.

Coronation Day, May 12, also marked the 10th anniversary of the last journey of the new King and Queen in the Victorian Government Railways royal train, prior to their departure in H.M.S. *Renown* from the State, during their Australasian tour in 1927.

UNITED STATES

Prospective Car Shortages

Last autumn, the season of maximum traffic, the American railways came periously near to a shortage of freight cars needed to meet the demands of traders. In the coming autumn it is estimated that there will be only 8 per cent. more cars than last autumn available to cope with an expected increase of 15 per cent. in freight traffic. Thus, unless the greatest effort is made to expedite movement and handling operations, it seems probable that a serious shortage in cars may develop. If such is the case, it will be the first occasion since 1923 when the railways have been unable to supply all the rolling stock requisitioned by traders.

CHINA

Centres of Population

In considering the new five-year construction programme and other railway schemes and connections throughout this vast country, it may be useful to note the 1935 figures denoting the populations of the following cities:—

Shanghai	3,529,000
Peiping	1,565,000
Tientsin	1,349,000
Canton	1,143,000
Nanking	952,000
Hankow	812,000

It may also be noted that there are eight Provinces with populations of over 25 millions, namely:—

Szechwan, in the far west ...	52,963,000
Kiangsu	36,469,000
Honan	34,290,000
Kwangtung, in the south ...	32,385,000
Hopei	28,645,000
Hunan	28,294,000
Shantung, in the north-east ...	28,029,000
Hupeh	25,542,000

Tatung-Puchow Railway

Construction of the northern quarter* of the Tatung—Puchow Provincial Railway is now being rapidly pushed forward, largely by the employment of military units, and it is hoped that the line will be completed throughout during the coming autumn. This line, which is of metre gauge, will run the whole length of Shansi Province from Tatung (on the Peiping—Suiynan Railway) through Taiyuan (the Provincial Capital) to Puchow, on the north bank of the Yellow River, opposite Tungkwan, an important station on the Lung-Hai Railway. As recently noted in these columns, the work of linking up the two lines by bridging the Yellow River is now in hand, and is estimated to cost over $1,000,000. The total length of the line from Tatung to Tungkwan will be nearly 500 miles.

New Railways Projected

On completion of the Tatung—Puchow Railway, another new line, about 150 km. in length, is to be undertaken, in order to connect Sohsien, in Northern Shansi, via Pinglu, and Hulingkerherh, with Kweihua, the capital of Suiyuan Province.

Another line 120 km. in length is proposed as a connection between Kiangsi and Hupeh Provinces. It will link Wuchang, the nothern terminus of the Canton—Hankow Railway on the Yangtze, opposite Hankow, with Nanchang, capital of Kiangsi, and is estimated to cost $13,000,000.

As well as the Canton—Meihsien Railway, already referred to in these columns as projected to cross Kwangtung Province east-north-eastwards from Canton, two other lines are proposed as its natural complements, both converging upon Meihsien. They are (*a*) from Swatow and (*b*) from Foochow, capital of Fukien Province.

Survey work for the Hunan-Kwangsi Railway is proceeding and will be completed in about four months. The estimated cost of the railway is $36,000,000 and it is hoped to begin construction in October next.

Arrangements are being made for Pullman first class sleeping cars and first class parlour cars to run on the express services between Shanghai and Canton when they begin in October.

* The southern three-quarters from Yuanping via Taiyuan to Puchow was completed in October, 1935.

INDIA

The Flying Ranee

A new special week-end second and third class express service, known as The Flying Ranee was inaugurated by the Bombay Baroda & Central India Railway on May 1, to carry Bombay citizens to and from the seaside resort of Surat, 168 miles distant northwards up the coast. The outward journey, which starts at 15.10 hr. (3.10 p.m.), is booked to be covered in an even four hours, but as there are nine intermediate stops aggregating 28 min., the running time is only 3 hrs. 32 min., which, allowing for the nine starts and stops, entails fast inter-stop running. In fact, the equivalent non-stop time would be only about 185 min. or 54½ m.p.h. The return journey is made between 5.47 and 9.47 on Monday mornings.

The load, on the inaugural day, consisted of eight bogie coaches weighing, with passengers, staff and luggage, about 450 tons, and was hauled by a modified (poppet valve) "H" class 4-6-0 locomotive. The third class return fare is only Rs 3-13 or under 5s. 9d. for the 336-mile double journey, ½d. a mile. The second class fare is Rs. 13-9, well under ¾d. a mile.

The inaugural ceremony was performed by Mrs. Sethna, wife of the District Traffic Superintendent, Bulsar, with these words:—

"I name you Flying Ranee, Queen of the West Coast. May all your trips be safe and speedy, and may all those who travel by you enjoy a happy and care-free holiday and a swift and comfortable homeward journey."

She then unveiled the ornate board on the smokebox seen in the illustration on page 1209.

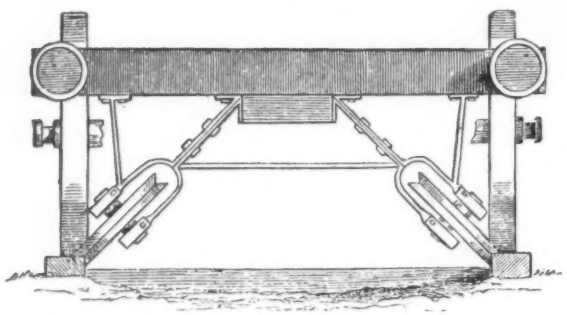
It is significant that within a fortnight of its initiation this train had become so popular that it had to be double-headed, and within three weeks it had to carry 1,400 passengers, and, as might be expected, was run in two parts. As adding further to its popularity special tickets have been issued to women since May 29, enabling them to travel at single fare for the return journey, instead of paying the normal 1½ fare for this week-end train. With the advent of the monsoon, however, there is likely to be a drop in this heavy traffic.

THE EVOLUTION OF RAILWAYS—VI

By CHARLES E. LEE

HAVING traced the introduction of the main features of railway permanent way up to the beginning of what may be considered the modern period, the main object of these notes has been completed, but it remains to be recorded how earlier types of rail disappeared. On the North-East Coast wooden wagon-ways remained in use long after the establishment of the present railway system, and Sir Lowthian Bell, writing in 1863,[61] remembered " within perhaps twenty years seeing them in use in the Garesfield Colliery Railway." Another survival was noted by Richard Lowry in his Diary for 1837, where he recorded that in the neighbourhood of Ewanrigg Hall, near Maryport, there was a wagon-way much dilapidated and shaken by wear. He added that " some of the wooden rails are covered with thin pieces of iron " and that " only one wagon is brought down at a time which runs the greatest part of the road itself, and is drawn up the incline again by a horse."

In the United States, the plentiful supply of timber resulted in many of the early passenger railways being built very much like our early wagon-ways. Timber rails were faced with thin iron strips called " strap iron " and there are many stories extant of these strips working loose and springing up through the floor boards of carriages while a train was in motion. This period was not long lived so far as main-line railways were concerned, but for many years the timber rail was a recognised feature of pioneer branch lines, and even today examples of this form of permanent way may be found in service.



Section through locomotive underframe built to Prosser's design, showing arrangement of guide wheels

William Prosser, in 1844, devised a system for using unflanged wheels on wooden rails of 8-in. scantling, and keeping the vehicles on the track by means of guide wheels fixed at an angle of 45 degrees, revolving upon independent axles. A deep groove in the circumference of the guide wheel embraced the upper surface and inner edge of the rail. It was to have been tried on the West London Railway, but the arrangements fell through. Then the Guildford & Woking line was projected on Prosser's system, but under L.S.W.R. auspices was eventually built as an ordinary railway. An experimental section of two miles was laid on Wimbledon Common in 1845, but the system was never adopted for public service.

John Curr junior, the son of the Sheffield pioneer, put forward a scheme in 1847[62] for a long wooden railway

[61] Reid's "Handbook to Newcastle-upon-Tyne " 1863.

[62] " Railway Locomotion and Steam Navigation: Their Principles and Practice."

Modern wooden permanent way in Australia, at Myers Creek, Healesville, Victoria; the photograph was taken about 1900

from Sydney, New South Wales. He said that in Australia wood was decidedly preferable to iron by reason of the fact that it did not expand lengthways owing to temperature variation. He added " the iron-bark tree of New South Wales, from its hardness and great specific gravity, is probably not to be surpassed by the timber of any part of the world. Its specific gravity, as compared with oak timber, is about the proportion of 14 to 10."

After the Civil War of 1861 to 1865 there was a period of tremendous expansion in North America, and in the eighteen seventies quite a number of railways used timber permanent way without even a metal facing. Early in 1872[63] it was recorded that a wooden railway of 4 ft. 8½ in. gauge was being constructed in the province of Quebec, Canada. The rails were of maple 4 in. by 7 in., and 14 ft. long; the ties were of hemlock and tamarac. The cost of the line, thirty miles long, including nine stations, car and locomotive depot, engine and repairing shops, engine and tender, two passenger cars, eight grain cars and twenty-five wood cars, was given as $8,500 a mile, including all damages. An experimental trip had been made on the completed portion of the road, and it was stated that the train went at the rate of twenty-five miles an hour and with remarkable smoothness.

[63] *The Engineer* of February 9, 1872, quoting from the *Technologist*.

The following quotations from the technical press of two years later give a fair impression of the position in the United States. The first[64] says:—

The South Carolina Central Railroad had been allowed to drop through the hands of the original projectors, and a considerable amount of cutting out and grading had been accomplished, when Messrs. Land and Pritchett, large turpentine distillers, purchased the right of way, and set about to construct a road that would take their products to market. The road from Manning to Lane's Turnout is fifteen and a-half miles long. The bed is constructed precisely as all other railroads are, but in place of iron this road has wooden stringers, which are five inches upon their face, and the tracks or wheels of the running stock are five inches upon their face. The friction in running being distributed over wide surfaces, the injury to the rails will be much less. The flanges to the wheels are two and a-half inches deep, thereby preventing any probability of running off. A portion of the road has been in operation five months, over which trains have been running daily, and most of the stringers are smooth. The rolling-stock on the road is common, but quite effectual. The engine is worth only $1,800, but is sufficient to carry seven or eight cars, loaded, at the rate of fifteen miles per hour. The road is regarded as a success, and answers all the purposes of a first-class iron road. The road has cost about $1,200 per mile. By this road 50,000 lb. can be sent twice a day.

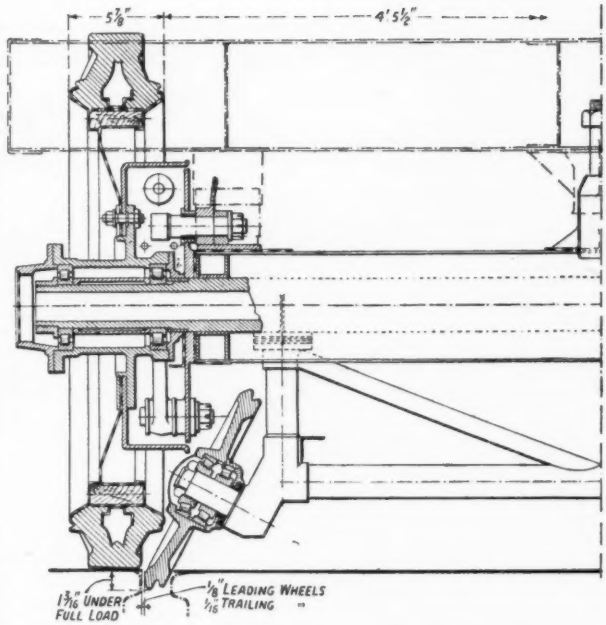
Our second example[65] states:—

The Tomah and Chicago narrow-gauge railroad, from Wauzeka to Reedstown, is expected to be in running order in September. The track on this route is laid with maple rails, which cost $15 per thousand feet. These rails, it is said, will last one year, without repairs, and thus it is estimated that the interest on the capital invested in iron rails on any road would relay that road with maple rails every year.

The British railway paper in which this is recorded—namely *The Railway News*—commented that, in districts where capital and transportation were limited, wooden rails might perhaps be found useful. This proved to be so, and even to the present day steam locomotives still work over wooden rails, but not so far as I am aware on passenger service.

Two examples must suffice to show that the idea still survives of using a guide other than a flanged wheel to keep vehicles on rails. One is to be found on Walton pier (Essex) where a worn-out electric railway was replaced at the beginning of the 1936 season by a pneumatic-tyred railcar with horizontal guide-wheels running in what is virtually a timber trough. The running wheels move along flat wooden rails that are flanked on the outside by another pair of wooden rails on a higher level, upon the side of which the guide wheels press.

Our second example results from the use of pneumatic tyres on rails, which has revived the same basic idea as that of William Prosser, so as to leave the rubber free from the flange or its equivalent. The system,[66] which is named after its inventor, Mr. E. C. Noble (formerly Chief Mechanical Engineer of the Entre Rios Railways), involves the use of inclined guide wheels. A railcar built on this principle was demonstrated[67] in June, 1935, between Bletchley and Oxford on the L.M.S.R. before being dispatched to Argentina for service on the Entre Rios Railways.

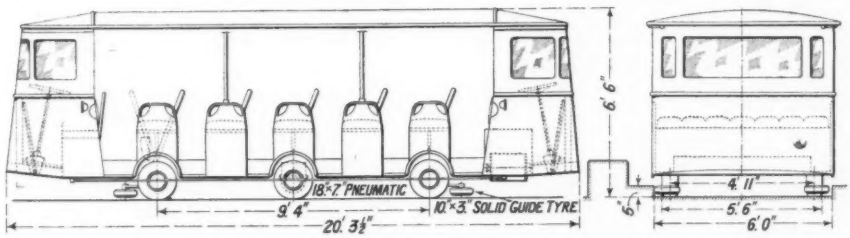


Layout of guide wheel and brake drum on the Noble system

The plate rail of L section as an accepted form of new railway construction did not survive the modern conception of the public railway. With the introduction of locomotive traction and high speed, it proved impracticable to regard the railway as a toll road available for the use of all-comers, and soon the owners of a railway became the sole providers of the means of haulage. In the writer's view this was quite as important a factor in early years as the reduced frictional resistance of the edge rail, in causing the plate rail to disappear. Under the new conditions of rail transport, the weight and constructional form of railway rolling stock made it unsuitable for road haulage, and the chief merit of the plateway—its ability to take road-rail vehicles—ceased.

With public railways, the plate rail was already regarded as a survivor of a bygone era when the Surrey Iron Railway ceased working on August 31, 1846. The Monmouthshire Railway system, which was the most extensive public plateway, found great difficulty in converting its lines owing to the large number of privately-owned tram wagons in use, but by adopting a combined tram and rail wheel, and subsequently a combined rail and tramplate, the transition period was successfully negotiated by 1855. Plateways in private ownership still survive and form a fascinating link with the past, but it is hoped that these notes will contribute to their being viewed by future historians in true perspective, and not regarded as an essential link in the chain of railway evolution.

(*Concluded*)



Pneumatic-tyred electric-battery railcar with horizontal guide wheels running in a timber trough on Walton pier, Essex. This vehicle, built by Electricars, Limited, was introduced at the beginning of the 1936 season

[64] *The Railway News* of April 11, 1874.
[65] *The Railway News* of July 4, 1874.
[66] See THE RAILWAY GAZETTE of December 15, 1933.
[67] See THE RAILWAY GAZETTE of June 21, 1935.

FEED WATER HEATERS FOR STEAM LOCOMOTIVES

Abstract of a paper read by Herr Obering. Peters of the Knorr-Bremse A.G., Berlin

IN a paper before the Betriebsleiter-Vereinigung Deutscher Privateisenbahnen und Kleinbahnen (Association of Operating Superintendents of German Private and Narrow-Gauge Railways), Obering. H. Peters, of the Knorr-Bremse A.G., Berlin, reviewed the advantages and technical development of feed water preheating for steam locomotives. The general arrangement of the steam locomotive remains substantially as Stephenson designed it, but its efficiency has been raised by constructional improvements, and many attempts have been made to reduce the losses caused by waste gases and exhaust steam respectively. None of the attempts to apply the waste heat of the flue gases to the preheating of the feed water and combustion air has gone beyond the experimental stage, mainly owing to the large dimensions of the economiser required by the low specific heat of the gases, and because of the continual cleaning needed to remove soot. On the other hand, exhaust steam has been applied very successfully to the preheating of feed water in the majority of

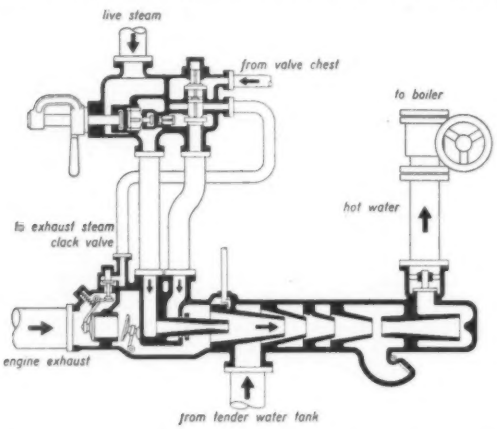


Fig. 1—Illustrating action of exhaust steam injector

express and stopping passenger locomotives and large goods locomotives.

The requirements imposed are:—

(1) Maximum heat economy. The gross heat recovery is measured by the ratio of the heat input of the feed water to the total heat content of the live steam. The net heat recovery is obtained by subtracting the live-steam consumption, for pumps in the case of surface and mixing preheaters, or the live steam flow to exhaust injectors, as the case may be. The saving of coal is higher than the heat recovered in the feed water, by an amount corresponding to the higher boiler efficiency which usually results from feed-heating.

(2) The delivery of the feed heater should be regulable from zero to a maximum in order that maximum recovery of heat may be effected at all boiler loads. The boiler feed should be at the same rate as the evaporation, thus maintaining constant water level in the boiler.

(3) Reliability is an obvious necessity. All moving parts should be wear-resisting and accessible without dismantling pipes or other parts.

(4) Maintenance and repair costs should amount to the smallest possible fraction of the saving in coal costs.

Exhaust Steam Injectors

The general construction of a feed heater of the exhaust steam injector type (Fig. 1) resembles that of a live-steam injector, additional nozzles permitting the engine exhaust to be used for the delivery and preheating of the feed water. The water nozzle is movable, permitting a certain amount of regulation in the quantity of feed water, whereas the live steam injector is practically incapable of regulation. A clack valve is needed to ensure the starting of an exhaust injector, and a change-over device is fitted so that throttled live steam can be used instead of exhaust steam when the regulator is closed. This change-over device controls the exhaust steam clack valve; otherwise, with closed regulator and open exhaust steam valve, the injector would draw air through the blast pipe. Working with exhaust steam alone, the injector is capable of delivering only against boiler pressures far below those of modern locomotives.

Mixing Feed Heater

This apparatus, shown diagrammatically in Fig. 2, consists of a mixing chamber and a feed pump with cold

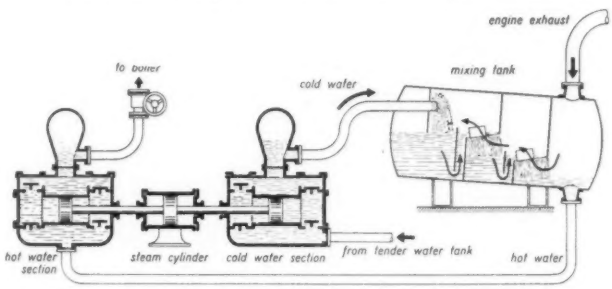


Fig. 2—Illustrating action of mixing feed heater

and hot water sections, driven, in this instance, by a single-stage steam pump. The cold-water pump draws water from the tender tank and delivers it in the form of a spray to the mixing tank, where it is warmed by the exhaust steam. The warm water, including the condensed exhaust, is delivered to the boiler by the hot-water pump.

Surface Feed Heater

This apparatus, shown diagrammatically in Fig. 3, consists of a tubular heat-exchanger using the heat of the exhaust steam for warming the feed water, which is pumped through the tubes on its way to the boiler as indicated.

The relative merits of the three basic types of feed heaters have been the subject of lively controversy. The exhaust

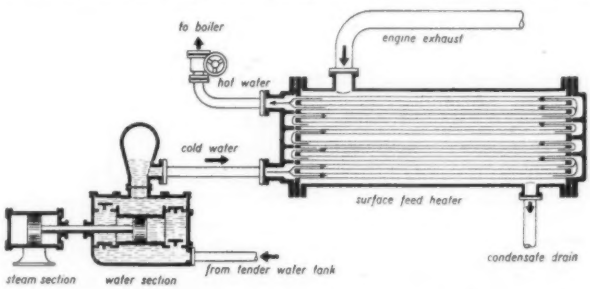


Fig. 3—Illustrating action of surface feed heater

injector is light and compact, but its net heat recovery is lower than that of the other two types, owing to the continual consumption of live steam. The use of a feed heater with feed pump is more economical, even allowing for the higher repair costs of surface and mixing feed heaters. The last mentioned types give equal net heat recovery if the same steam drive is used for the feed pump.

There are physical limits to the regulation of the exhaust injector, and to the range of control, which narrows with increasing temperature of water in the tender, increasing live steam pressure, and increasing wear of the nozzles. With an unfavourable combination of circumstances, the regulation is practically nil. Notwithstanding extensive trials by the German State Railway, the exhaust injector has made no headway in Germany, and in this and other countries the latest locomotives are fitted with mixing and surface feed heaters.

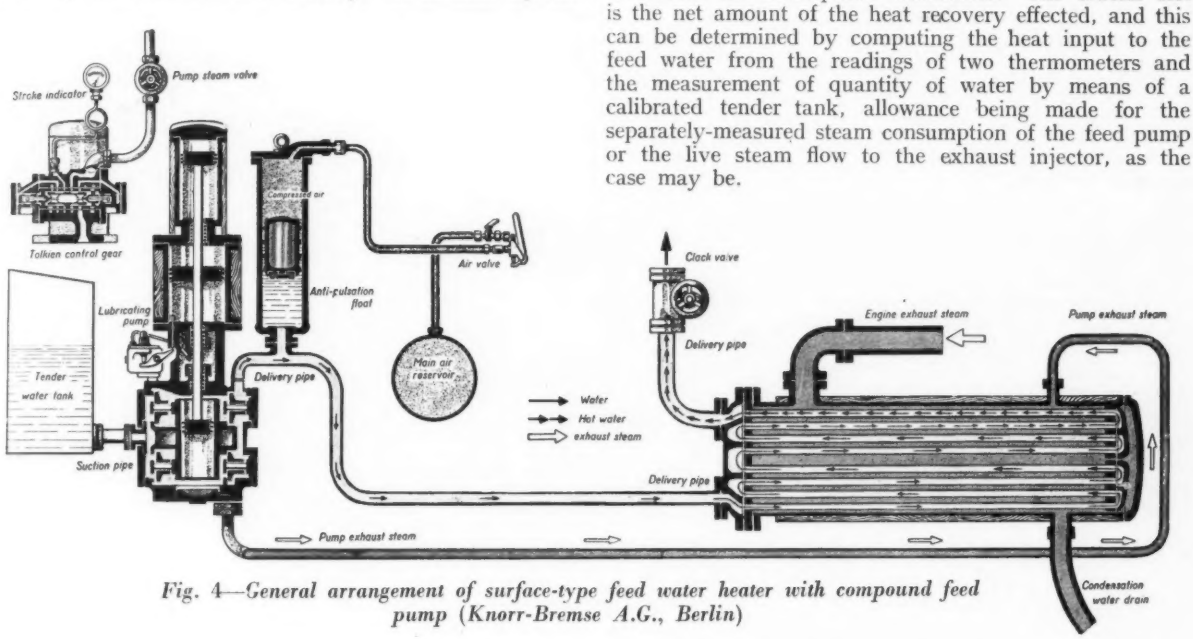


Fig. 4—General arrangement of surface-type feed water heater with compound feed pump (Knorr-Bremse A.G., Berlin)

The mixing feed heater requires cold and hot water pumping, though an injector or a centrifugal pump is sometimes used for the cold-water stage. With two reciprocating pumps, there is twice the number of pistons, valves and stuffing boxes subject to wear. The wear in the hot-water stage is specially great, owing to the presence of scale-forming solids which are liable to produce serious deposits if the water is hard. A sufficient pressure head must be maintained at the suction of the hot-water pump to prevent the formation of steam, and the delivery of the cold-water pump must be greater than that of the hot-water pump, with provision, usually in the form of an overflow, to maintain constant water level in the mixing tank. The use of a double water pump complicates operation and repair and for the reason of avoiding still larger dimensions the economical compound drive has not hitherto been applied to mixing heater pumps. The use of feed heaters of this type is very restricted in Germany and the Northern Countries as well as the Balkan States, but in France the A.C.F.I. feed-heating system is used extensively.

Surface-type feed-heating apparatus requires a feed pump with one water cylinder only, which is regulable between zero and maximum, independent of the cold water temperature, the boiler pressure, and the exhaust steam pressure. An important characteristic is the automatic variation of the quantity of exhaust steam flowing to the heater. When the final temperature of the heated feed water reaches 212° F., the exhaust steam is no longer fully condensed, and owing to the building-up of back-pressure in the steam space of the feed heater, the pressure difference between blast pipe and feed heater is reduced and the flow of steam to the latter decreases.

Different and often contradictory test results as to the saving of fuel attainable by the use of a feed water heater cannot be avoided so long as tests are based only on coal measurements. The actual coal consumption depends on the steadiness or otherwise of the load on the locomotive, the skill of the driver and fireman, the quality of the coal, and the atmospheric conditions. The crucial test is the net amount of the heat recovery effected, and this can be determined by computing the heat input to the feed water from the readings of two thermometers and the measurement of quantity of water by means of a calibrated tender tank, allowance being made for the separately-measured steam consumption of the feed pump or the live steam flow to the exhaust injector, as the case may be.

The contention, sometimes advanced, that feed water preheating cannot be provided in a new locomotive without exceeding the permissible axle load, is entirely unfounded. Taking the average boiler weight to be 1 metric ton per 10 sq. m. (about 18 cwt. 1 qr. per 100 sq. ft.) of heating surface, in a locomotive with a boiler of 200 sq. m. (2,153 sq. ft.) heating surface for a working pressure of 16 kg. per sq. cm. (227 lb. per sq. in.), and allowing for the fact that a feed water heater permits the boiler heating surface to be reduced by about 10 per cent., there is a saving of 2 metric tons (1 ton 19 cwt. 1 qr.) on the weight of the boiler. As the largest surface-type feed heater weighs only 0·9 metric tons (17 cwt. 3 qr.), there is a net saving of at least 1 ton on the total weight of the locomotive with feed heater.

Knorr Preheater Plant

Surface-type feed heaters with compound pumps are used throughout the German State Railway system, and a number of the larger private railways and foreign railways have recently decided in favour of the surface-type preheater.

The accompanying illustration, Fig. 4, shows the general arrangement of the Knorr preheater plant, consisting of a compound feed pump with Tolkien control gear, anti-pulsation float, and a surface type heat exchanger. The method of working, and particularly the flow of feed water from tender tank to boiler, is shown clearly by

the drawing. The compound pump with Tolkien control gear has several important advantages. Its steam economy at outputs up to 40 tons per hr. is exceeded by no other steam drive available for locomotive feed, and any wear occurring in service has practically no effect on the steam consumption. Also, the set adjusts itself automatically to minimum steam consumption, the admission pressure being only that corresponding to the desired output. Any accumulation of water, due to defective draining, is gradually evacuated through the exhaust. The steam and water pistons are mounted on a rod of Nirosta steel; a self-adjusting metallic packing is used between the high and low pressure cylinders, and soft packing is used in the other stuffing boxes.

The Tolkien control gear is the first commercially successful fully force-closed control (without rods or joints) for direct-acting compound pumps, and its steam consumption is exceptionally low because of the useful work done by the control steam after passing from the main control chambers to the receiver. The easy accessibility of the gear is an important advantage. The water valves are individually accessible and can be completely assembled at a bench vice. The rings of the water piston are of special synthetic resin, requiring no attention between general overhauls.

In spite of all its advantages in other respects, the reciprocating steam pump could hardly have remained in use had not a satisfactory means been found for damping its pulsations. An ordinary air vessel on the delivery pipe is initially effective, but is soon rendered inoperative by the air being absorbed by the water. In the arrangement shown in Fig. 4, however, a float cylinder virtually prevents contact between water and air, and arrangements are made for recharging the receiver from the main air reservoir at intervals which may amount to several weeks. Knorr-Tolkien pumps are made in two sizes, one for 125 litres (27½ gall.) per min. or 200 litres (44 gall.) per min. on overload; the other for 250 litres (5 gall.) up to 400 litres (88 gall.) per min., for boiler pressures up to 30 kg. per sq. cm. (427 lb. per sq. in.). The latest pumps work at 80 kg. per sq. cm. (1138 lb. per sq. in.) and 450° C. (842° F.) superheat.

The surface type heat exchanger consists of a nest of tubes fixed at only one end, and with a divided tube plate at the other end, thus permitting free expansion of the warmer tubes relative to the cooler ones. The rate of heat transmission increases with the velocity of the water, owing to the greater turbulence, and in the latest surface type preheaters the heating surface and number of passes are such that the final temperature of preheating is nearly 100° C. (212° F.) at all loads, with a minimum total heating surface and reasonable resistance to flow in the tubes. The turbulent flow helps to prevent scale deposits, and a saving of weight is effected by welding the steam casing.

The recovery of condensate is important in districts with hard or scarce water supply. Where exhaust steam injectors or mixing preheaters are used, the condensate is automatically recovered, and its recovery is practicable from surface type preheaters if, as on the German State Railway, the preheater is mounted high in the smokebox, giving the condensate a gravity flow back to the tender. Condensate return on this principle is not yet generally employed, because of the lack of a reliable oil separator. The author's investigations show, however, that only a very small proportion of the oil in the exhaust steam is removed by the separators used with exhaust steam injectors and mixing preheaters. Most of the oil goes to the boiler with the feed water, but apparently it causes no trouble and it would be useful to have authoritative trials of the effect of returning condensate from surface type preheaters without an oil-separator. In some quarters it is believed that the oil is actually beneficial by conducing to the formation of an easily removable sludge instead of crystalline adherent scale.

Floodlighting arrangements at the Cockfosters depot of the Piccadilly Line, London Passenger Transport Board

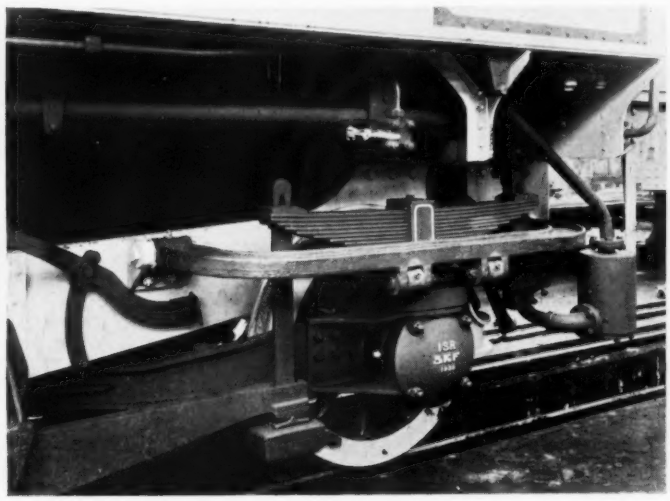
(*See editorial note on page* 1191)

NEW 4-6-2 TYPE EXPRESS LOCOMOTIVES FOR INDIA

These engines, built by the Vulcan Foundry Limited, are of an experimental XP design, the equipment including roller bearings throughout

WE recently visited the works of the Vulcan Foundry, Limited, at Newton-le-Willows, Lancs., for the purpose of inspecting some new XP type locomotives built there for the Great Indian Peninsula Railway, under the inspection of Messrs. Rendel, Palmer & Tritton, Consulting Engineers, Westminster, S.W.1. The design is to a large extent experimental, in that it incorporates many features not ordinarily built into the standard locomotives of this classification. An examination of these interesting locomotives, of which two have been constructed, shows that a great amount of care and skill has been expended in working out the design, and it is of interest, before going on to describe the engines, to call the attention of our readers to the reasons for departing from the usual standards in building them.

Driving crank pin with SKF roller bearings



Hind truck of special design. SKF roller bearings

The main purpose in planning the new design was to secure an engine which could be relied upon to complete large mileages in express passenger traffic between overhauls, thus increasing the availability of the locomotives over a given period, the figures aimed at being an average monthly mileage of 10,000 and the completion of 200,000 miles between stoppings for major overhauls. This involves, as a primary consideration, the accessibility of all items needing running shed attention, and the designing of every detail in such a manner that reliability over long periods can be assured, and this without reducing, but, if anything, increasing the demands made upon the locomotives on performance account. With these ideals in mind, a close investigation of the design of XB locomotives was made, and the general arrangement of the type, as such, taken as the basis on which to build up the improved specification.

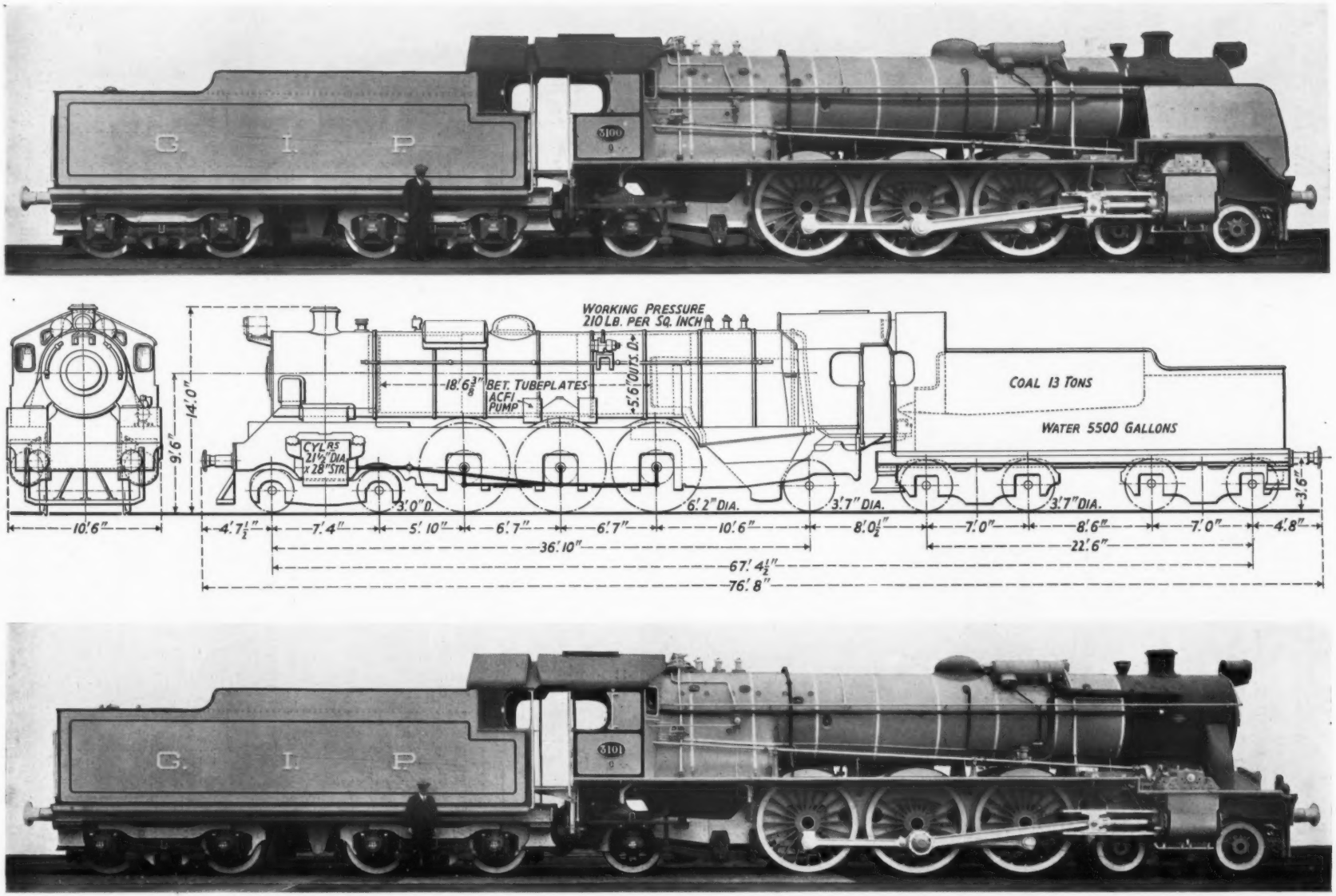
The wheel arrangement is 4-6-2, and two outside cylinders are employed, driving the middle pair of coupled wheels. The boiler is of large proportions with a round-topped wide pattern firebox, the latter fitted with thermic syphons, and it will be realised that thus far the engine belongs to what is usually regarded as an orthodox type. When, however, the design is studied in detail, it will be found that many departures have been made from the standard, and that numerous improved details have been introduced, principal among them being perhaps the fact that each engine is equipped throughout with roller bearings. We are enabled to reproduce illustrations herewith showing the assembly of some of these bearings.

Roller Bearings

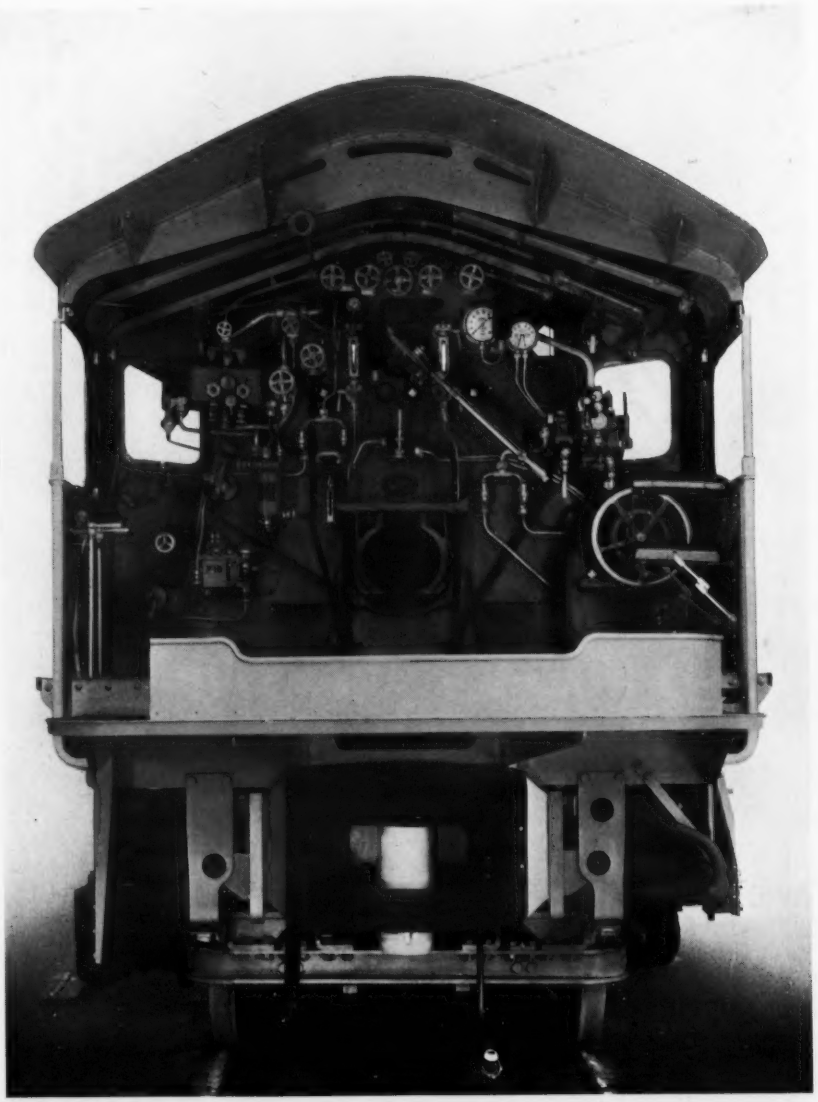
One of the locomotives, No. 3101, is equipped with SKF roller bearings, and the other, No. 3100, with Timken bearings, and the opportunity has been taken in building the two engines to vary the arrangement of details in some respects. Two points which can be noted from the photographic illustrations reproduced herewith, are the differences between the big ends of the connecting rods, and shape of running boards; the Timken fitted engine has spring controlled self-aligning crossheads, and the SKF engine crossheads of orthodox type. In a more detailed article which we hope to publish in a later issue, further illustrations and particulars will be given of these and other points in the design.

Steam distribution to the cylinders is effected by Caprotti valve gear mechanism with inside drive. The drawgear is of the Système Mestre type, a feature of which is that the weight of the tender is utilised to control the oscillation of the hind end of the engine, the tender being rigidly attached to the engine through the drawgear. Welding is largely employed in the construction of the tender, and also to some extent in that of the engines.

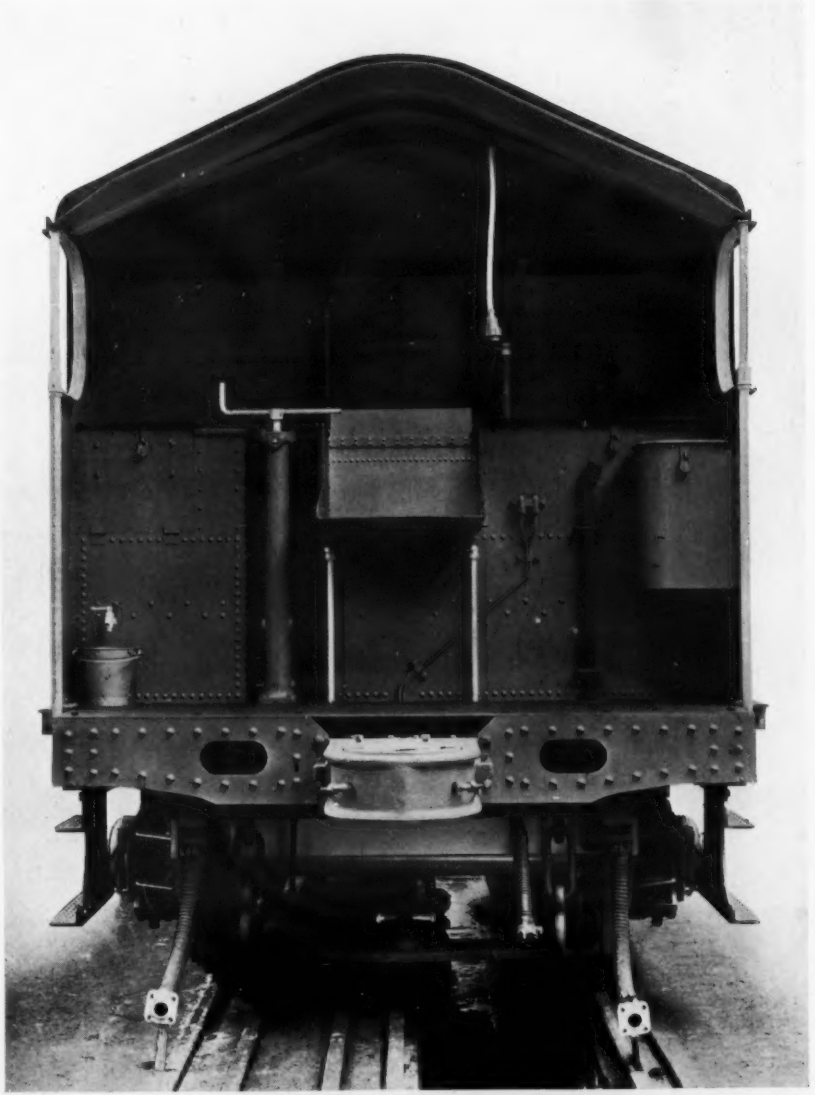
The locomotives were designed and constructed for high-speed passenger service, and as was to be expected, in-



New 4-6-2 type express locomotives of special design for the Great Indian Peninsular Railway. These engines are fitted with roller bearings to all wheels. Top engine Timken and lower Skefko bearings



View of cab and footplate showing pin of Mestre coupling



Front end of tender with portion of Mestre coupling

NEW 4-6-2 TYPE EXPRESS LOCOMOTIVES FOR INDIA

spection showed that the workmanship and finish throughout are of the highest class.

The following are the leading particulars:—

Cylinders, dia.	21½ in.
Piston stroke	28 in.
Wheels, bogie, dia.	3 ft. 0 in.
,, coupled, ,,	6 ft. 2 in.
,, hind truck, ,,	3 ft. 7 in.
Boiler, heating surface—	
Flues and tubes	1,543 sq. ft.
Thermic syphons	50 ,, ,,
Firebox	192 ,, ,,
Total evaporative	1,785 ,, ,, ,,
Superheater	504 ,, ,,
Total	2,289 ,, ,,
Grate Area	45 ,, ,,
Boiler pressure	210 lb. per sq. in.
Tender—	
Water capacity	5,500 gallons.
Coal ,,	13 tons.
Wheels, dia.	3 ft. 7 in.

	Timken			*Skefko*		
	tons	cwts.	qrs.	tons	cwts.	qrs.
Weight of engine in working order	99	0	0	98	17	2
,, tender ,, ,,	74	2	2	74	2	2
,, engine and tender, in working order	173	2	2	173	0	0

The weight of each of these engines is distributed as follows:—

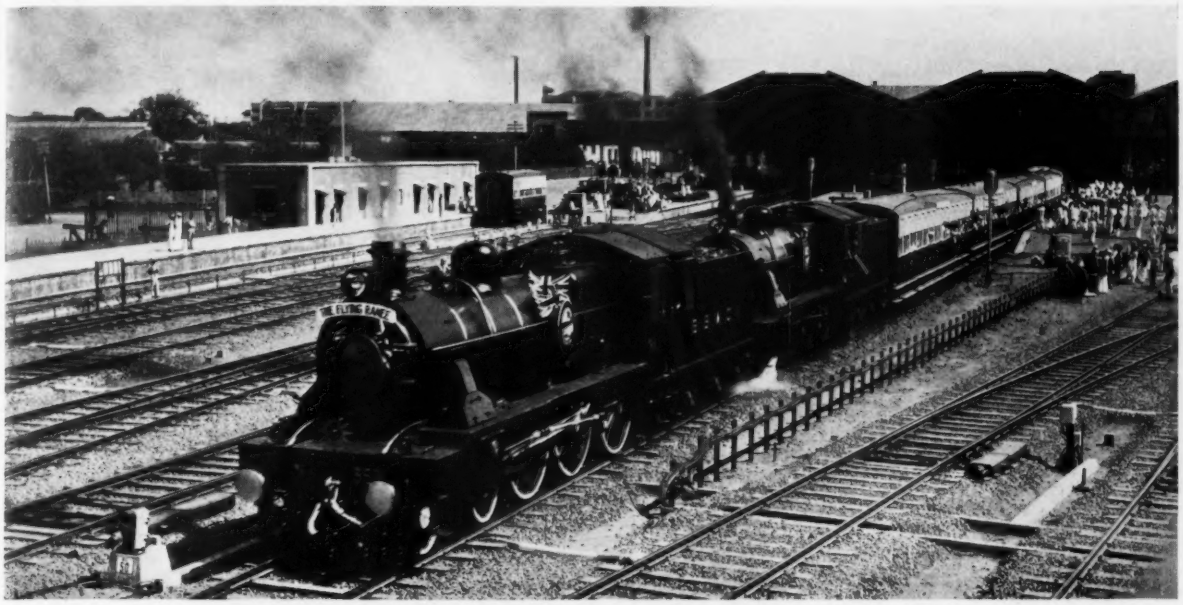
	Timken			*Skefko*		
	tons	cwt.	qrs.	tons	cwt.	qr.
On leading bogie	25	19	1	25	15	2
,, ,, coupled wheels	18	11	2	18	12	3
,, middle ,, ,,	18	11	0	18	10	2
,, trailing ,, ,,	18	13	1	18	14	1
,, pony truck ,,	17	5	0	17	4	2
Tender—						
On leading bogie	36	16	2	36	16	2
,, trailing bogie	37	6	0	37	6	0

Fittings and materials used in these engines were contracted for and supplied by the following firms:—

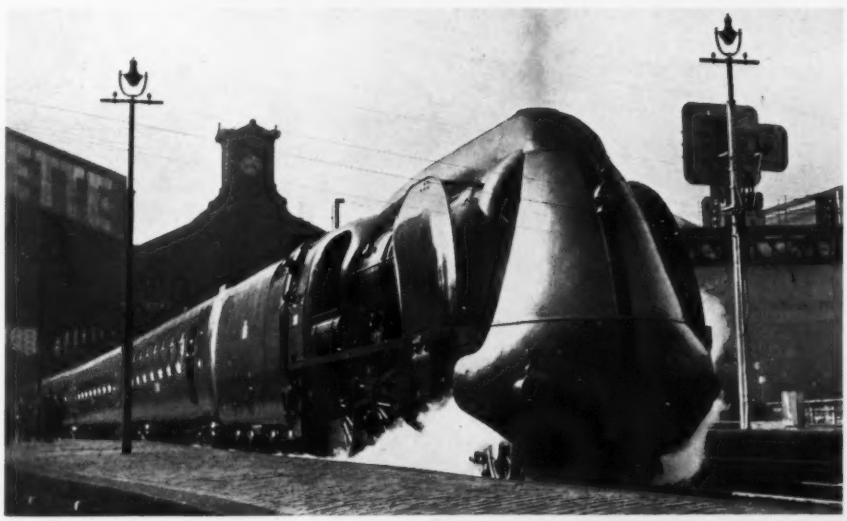
Superheater equipment: Superheater Co. Ltd.
Inside Firebox Plates. Special firebox quality steel: Colvilles Limited.
Thermic syphons: Whitelegg & Rogers.
Flannery Flexible Stay Assemblages: Baldwin Locomotive Works.
Longstrand steel-firebox rigid stays: Brown Bayley's Steel Works Limited.
Clyde soot blowers: Clyde Blowers Limited.
Ross safety valves: R. L. Ross & Co. Ltd.
Everlasting blow-off cocks: Everlasting Valve Co. Ltd.
Klinger screw-down piston-valve type valves: Richard Klinger Limited.
Klinger sleeve-packed cocks: Richard Klinger Limited.
Klinger water gauges and cocks: Richard Klinger Limited.
Asbestos mattress (part firebox): J. W. Roberts Limited.
A.C.F.I. feed water heaters and pump: A.C.F.I. Limited.
G. & C. No. 10 injector: Gresham & Craven Limited.
Vacuum brake fittings (for train working): Vacuum Brake Co. Ltd.
Lambert sanding equipment: Freins Jourdain Monneret.
Sunbeam electric headlamp, generator and lamps: Baldwin Locomotive Works.
Stone's composite switch fusebox and connections: J. Stone & Co. Ltd.
Caprotti valve gear: Caprotti Valve Gear Limited.
Clupet piston rings: Clews Petersen Piston Ring & Engineering Co. Ltd.
Britimp piston rod metallic packings: British Metallic Packings (1933) Co. Ltd.
Wakefields A.C. type lubricator with transfer filler: C. C. Wakefield & Co. Ltd.
Meehanite castings: Ealing Park Foundry Limited.
Tecalemit grease lubrication details: Whitelegg & Rogers.
Krupps special steel-crankpins: Fried. Krupp, A.G.
Rolled Manganese steel for axlebox guide liners: Hadfields Limited.
Ferodo and Ferobestos liners and bushes: Ferodo Limited.
Timken roller bearing axleboxes: British Timken Limited.
Skefko roller bearing axleboxes and roller bearings: Skefko Ball-Bearing Co. Ltd.
Barco connections for steam brake piping: American Locomotive Sales Corporation.

New Lightweight Metal Coaches, Swiss Federal Railways

THE new lightweight rolling-stock referred to in the April 30 issue of THE RAILWAY GAZETTE will be in service this month on the 7.7 a.m. express from Zurich to Geneva and the 7.40 p.m. express in the reverse direction. The present order is for two second class and five third class coaches and a composite buffet and third class coach. An ordinary six-wheeled van, in which a mail compartment is being provided, will be used on these trains for the time being, but a lightweight mail and luggage van is to be built later. The normal composition of the trains, hauled by a 2-C-1 electric locomotive, will be one second class and two third class coaches, the buffet car and the van. The new vehicles were built by the Schlieren Carriage Works. Their overall length is 22·70 m., the total wheelbase 19·47 m. for the second class, and 19·70 m. for the third class coaches, and the bogie wheelbase 2·70 m. for both types. Instead of the usual end platform entrances, vestibules with double doors are provided some distance from each end, dividing the coaches into three compartments; collapsible seats are fitted in the vestibules. The second class coaches seat 48, and the third class 72, or 80 including the use of collapsible seats. Both tare 27 tonnes, whereas ordinary Swiss express coaches weigh from 38 to 42 tonnes; the tare weight per passenger is 560 kg. second class and 337 kg. third class. Electric lighting and heating are fitted, and the Westinghouse brake equipment has been specially adapted for high-speed running.



Above: The Flying Ranee of the B.B. & C.I.R. leaving Bombay Central, with two poppet-valve 4-6-0's in charge. (*See overseas paragraph on page* 1199)



Below: 5 XP Jubilee class 3-cylinder locomotive in Crewe works, L.M.S.R., fitted experimentally with double chimney

Above: New streamlined train leaving St. Lazare, Paris, French State Railways. The locomotive is a four-cylinder simple 4-6-0 *rebuilt with improved valve gear and exhaust arrangements and fitted with the Huet system of wind deflectors* (*see editorial note on page* 1191). *Recently tested in service, this locomotive, without exceeding a special speed limit of* 87 *m.p.h., hauled a train of five of the new* 35-*ton lightweight coaches, described in "The Railway Gazette" of May* 21, *over the* 142 *miles between Paris and Le Havre in a net time of two hours*

SIR ERIC GEDDES

It is with regret that we have to record the death on June 22 of the Right Hon. Sir Eric Geddes, G.C.B., G.B.E., at his residence, Albourne Place, Hassocks, Sussex, at the age of 61. An editorial article on page 1194 appraises his career.

Born in India on September 26, 1875, Eric Campbell Geddes was educated in Scotland at Merchiston School, Edinburgh, and elsewhere. He was destined for the Royal Engineers, and had passed the preliminary examination at Woolwich when, at the age of 17, he abandoned this and went to seek his fortune in the United States. There he worked for the next four years at a variety of occupations, lumberman, brakesman, postmaster, etc., finishing up on the Baltimore & Ohio Railroad. Returning home, he was next offered a post on a forestry estate in India, which included 50 miles of public light railway. From this, he transferred to the Rohilkund and Kumaon Railway, ultimately becoming Traffic Superintendent.

After 11 years in India, he succeeded in obtaining employment on the North Eastern Railway during the management of the late Sir George Gibb. Starting as Claims Agent in 1904, his rise was phenomenal, for in the short space of six years, he became successively Commercial Agent (1905), Deputy Chief Goods Manager (1906), Chief Goods Manager six months later, and in 1911 Deputy General Manager, with a reversion to the General Managership.

On the outbreak of the war, he assisted the Railway Executive Committee, and in 1915 was selected by Mr. Lloyd George as Deputy Director General of the new Ministry of Munitions. In the following year, he was knighted, but his services to the State were in reality only just beginning. The transport situation in France had become serious, and Sir Eric Geddes was appointed Director General of Transportation on Sir Douglas Haig's staff, in which capacity he reorganised the military transport system on the Western front; subsequently he became Inspector General of Transportation in all theatres of war, with the honorary rank of Major-General. In the same year, his services were transferred to the Admiralty, and he became, first, Controller of the Navy, ranking as Vice-Admiral; and later, First Lord of the Admiralty. Since this entailed Cabinet rank, he had previously entered the political arena and became Unionist Member for Cambridge.

On the conclusion of the war, he brought forward a scheme for the complete unification of the railways and other means of communication under State control, and as Minister without portfolio, he piloted the necessary measure through Parliament which set up the Ministry of Transport. In 1919, he became the first Minister of Transport, with a seat in the Cabinet, but after the Ministry had experienced a stormy career of two years, a change of policy was decided upon. A policy of severe retrenchment having been decided, Sir Eric was appointed Chairman of a committee to review all phases of National expenditure. This was the famous "Axe" Committee, which recommended a total reduction of some £100,000,000 per annum and the abolition of many Government activities, including the drastic reduction of the Ministry of Transport.

Thereafter, Sir Eric resigned his seat in Parliament, and transferred his abilities to the sphere of industry. He became Chairman of the Dunlop Rubber Company and allied undertakings, and subsequently Chairman of Imperial Airways Limited. In the latter capacity, he played a most important part in the building up of civil aviation in this country, and in the development of Empire air communications. In all these undertakings, both during the war and after, he was ably assisted by his former colleague on the North Eastern Railway, Sir George Beharrell.

A portrait taken in the prime of life of the late Rt. Hon. Sir Eric Geddes, G.C.B., G.B.E.

Sir Eric was elected President of the Federation of British Industries in 1923. He was first President of the Institute of Transport (1919-20), and was Vice-President of the Junior Institution of Engineers, by which body he was awarded the Gustave Cauet Medal in 1922. He also served as President of the Association of Trade Protection Societies in 1923. Knighted in 1916, he was created G.B.E. in 1917, when he also became a Privy Councillor, and G.C.B. in 1919. Sheffield University conferred upon him the honorary degree of LL.D. in 1920. A year or two ago he had an illness which left his heart affected, and eventually led to his death at the age of 61.

He married in 1900 Gwendolin, daughter of the Rev. A. Stokes, and leaves three sons. His younger brother, Sir Auckland, who had adopted a medical and academic career, also attained distinction during the war, and became President of the Board of Trade and Ambassador to the U.S.A.

There is to be a private cremation of the body of Sir Eric Geddes, after which the ashes will be dispersed over the sea from the Empire Flying Boat *Caledonia*, on the track of the Imperial Air Mail route. A memorial service is to be held at St. Columba's, Pont Street, S.W.1, on Monday next at 12.30.

The following account of Sir Eric Geddes' schooldays appeared in the course of an article in *The Times* on Wednesday: "In a broadcast address delivered in May, 1932, he related that he was 'just an ordinary schoolboy who would not study,' fond of his family, but frankly impossible to guide. He was at seven schools, six of which claimed the credit for his subsequent success; but in fact, with one exception, they had all asked his father to remove him as likely to do better elsewhere. 'In other words,' he added, 'I got sacked.' After a dispute with his father, he went off to America on his own account at the age of 17."

RAILWAY NEWS SECTION

PERSONAL

Viscount Horne of Slamannan, Chairman of the Great Western Railway Company, was introduced into the House of Lords on Wednesday, June 23.

The Minister of Transport has, with the approval of the Prime Minister, appointed Mr. Leonard Browett, Second Secretary to the Board of Trade, to be Secretary to the Ministry of Transport in succession to Sir Cyril Hurcomb. As recorded in our issue of May 28, Sir Cyril Hurcomb has been appointed an Electricity Commissioner.

Mr. R. S. Hudson, M.P., Secretary of the Department of Overseas Trade, has appointed Mr. W. Harpham and Mr. A. E. Percival to be his Private Secretaries for Department of Overseas Trade and for Board of Trade duties respectively, and Mr. Ronald Tree, M.P., to be his Parliamentary Private Secretary (unpaid).

M. Georges Legoux, Assistant General Manager of the Eastern Railway of France, has been appointed General Manager of the French State Railways to succeed M. Raoul Dautry, who is named Honorary General Manager. M. Legoux will take up his new duties on July 1. As announced last week, M. Dautry, whose retirement became effective on June 12, was temporarily replaced by M. Pierre Levy, Ingenieur en chef attaché à la Direction. M. Legoux, who is 42 years of age, was educated at the Ecole Polytechnique and at the Ecole des Ponts et Chaussées. He entered the service of the Eastern Railway Company in 1924 in the traffic department, where he rapidly rose to the highest rank. He is a Chevalier de la Légion d'Honneur.

M. Grimpret, Secretary General of the Ministry of Public Works, has been appointed President of the Council for the State Railways System. M. Richard Riboulet, President de Section au Conseil d'Etat, and M. Richard, Conseiller d'Etat, have been nominated members of the council to replace M. Chardon, appointed Honorary President of the council, and M. Helbronner, who has resigned, together with M. Sylvain Dreyfus, Vice-President, and M. Maurice Ganne. M. Riboulet will take the post of Vice-President of the Council.

Mr. A. Duncan, who, as announced in THE RAILWAY GAZETTE of May 7, has succeeded Mr. V. E. D. Jarrad as Agent of the Bengal-Nagpur Railway, joined that railway in March, 1903, and after completing his training in the Traffic Department, was confirmed as an Assistant Traffic Superintendent ten months later. In later years he acted as District Traffic Superintendent on several occasions, and was for a time Personal Assistant to the Agent. In 1920 he was confirmed as District Traffic Superintendent, and acted as Deputy Manager. In July of the following year his services were lent to the Government of India, when he became Assistant Secretary to the Railway Board for a period of about two years. On return to the B.-N.R., Mr. Duncan held several administrative posts such as Superintendent, Transportation, and Deputy Manager, and was confirmed as Transportation Manager, in 1929. It is from this position that he has now been promoted Agent, with effect from May 1. He is an Honorary A.D.C. to His Excellency the Viceroy, and was until recently Commanding Officer of the B.-N.R. Battalion, Auxiliary Force, India.

Mr. A. Duncan,
Appointed Agent, Bengal-Nagpur Railway

SOUTH AFRICAN STAFF CHANGES

Mr. T. H. Watermeyer, General Manager, having proceeded on leave, Mr. W. J. K. Skillicorn, Assistant General Manager (Commercial) is acting as General Manager.

Mr. Cheadle, Chief Traffic Manager, has been appointed to act as Assistant General Manager (Commercial), and Mr. W. E. Turnbull as Chief Traffic Manager.

Mr. M. M. Loubser, Assistant Chief Mechanical Engineer, has been appointed to act as Chief Mechanical Engineer, in place of Mr. W. A. J. Day during his absence on official duty overseas, and Mr. N. G. F. Witt is acting as Assistant Chief Mechanical Engineer.

Mr. W. Heckroodt, System Manager, Pretoria, has been appointed to act as Chief Superintendent (Staff) at headquarters, in place of Mr. P. D. Troskie during his absence on official business. Mr. J. G. K. Agnew is acting as System Manager, Pretoria.

In April Mr. R. P. Hayes, Inspecting Engineer, at headquarters, South African Railways and Harbours, retired after 34 years' service. In 1901 Mr. Hayes was appointed to the staff of the Central South African Railways, and posted to the survey of the Springs-Eastward line. Two years later he was transferred to the Cape Government Railways as Assistant Engineer on survey and construction works, but in 1907 he resigned and proceeded overseas, returning, however, in 1909 to his former position, but on relaying and deviation work at Grootfontein. After some years he became District Engineer on similar works elsewhere, and in 1923 he proceeded to the Glencoe-Pietermaritzburg electrification, soon afterwards succeeding Mr. Moyers there as Resident Engineer. Mr. Hayes was placed in charge of the Cape suburban electrification in 1926 and on its completion became District Engineer, Cape Town in 1928. Three years later he was promoted to be System Engineer at East London, and in 1934 was appointed Inspecting Engineer at headquarters, the position from which he has now retired.

Mr. N. L. Wallis, who, as announced in THE RAILWAY GAZETTE of June 11, has been appointed District Engineer,

Stoke, L.M.S.R., was educated at Repton and the Imperial College of Science and Technology (London University), where he obtained the degree of B.Sc. (Engineering), London, with first-class honours in 1911, and the Diplomas A.C.G.I. and D.I.C. During the following year he obtained practical experience with Humphreys & Glasgow Limited, carburetted water-gas engineers, Victoria Street, Westminster, and from 1913 to 1915 was with the Melbourne Harbour Trust, where he was

Mr. N. L. Wallis,
Appointed District Engineer, Stoke, L.M.S.R.

engaged in various work including the design of the travelling passenger bridges at Port Melbourne. From 1915-18 Mr. Wallis was Designing Engineer to the Australian Commonwealth Lighthouse Service, Melbourne, and designed the Cape Don Lighthouse, N.T., and in the two following years was an Assistant to Kay, Macnicol & Company, Consulting Engineers, Sydney, where he was connected with a mechanical coal handling scheme. Returning to England, Mr. Wallis was appointed an Assistant Engineer, Port of London Authority, in 1920, and for five years was employed at the East and West India and Millwall Dock group. In 1925 he entered the service of the L.M.S.R. as Resident Engineer for the Broadholme to Ambergate widening scheme, near Derby, but in the following year was transferred in a similar capacity to Heysham Harbour, where he carried out the alterations necessary for the combined Fleetwood and Heysham-Belfast service. From 1928 to 1932 he was Assistant to the District Engineer, Lancaster, with charge of the Fleetwood Docks, Harbour and district, where he was responsible for the design of the proposed new dock. Mr. Wallis was in 1932 transferred as Assistant to the District Engineer, Liverpool (Edge Hill), and was promoted in 1935 to be District Engineer, Abergavenny, which position he now vacates to go to Stoke.

The King has granted permission to Sir Robert Abbott Hadfield, Bart., to wear the insignia of Commander of the Legion of Honour, conferred upon him by the French President.

The Rt. Hon. Walter Runciman, formerly President of the Board of Trade, has taken the title of Viscount Runciman of Doxford, of Doxford in the County of Northumberland.

From *The London Gazette* of June 1: Regular Army Supplementary Reserve of Officers, Royal Engineers, Transportation: B. M. Strouts to be Second Lieutenant (May 12).

Mr. H. V. Potter, B.Sc., F.I.C., M.I.Chem.E., Managing Director of Bakelite Limited, has been elected Chairman of the British Plastics Federation Limited; and Major H. C. Parker, A.M.I.E.E., a Director of Thomas de la Rue & Co. Ltd., has been elected Vice-Chairman of the federation.

The following are among the first class appointments recently announced by the Crown Agents for the Colonies:—

Mr. S. D. Tuck, to be Assistant District Traffic Superintendent, Palestine Railways.

Lt. A. L. Nelson, to be Marine Officer, Marine Department, Railways and Port Services, Tanganyika Territory.

Mr. Hsieh Lu-hsi, General Manager of the Eastern Travel Service, is visiting Manchuria to confer with the Manchukuo State Railway authorities on through traffic arrangements on the Peiping-Mukden Railway.

Japanese Government Railway officials and others attended a memorial service at the grave of Edmond Morrell in the Yokohama Foreign Cemetery on the occasion of the 65th anniversary of Japanese Railways, to the development of which Mr. Morrell, a British engineer, contributed valuable service.

Indian Railway Staff Changes

Mr. T. T. Lambe, officiating Assistant Chief Controller of Standardisation (Mechanical), Railway Board, has been granted 3½ months' leave as from March 23.

Mr. H. H. Cooper has been appointed to officiate as Deputy Chief Mechanical Engineer, N.W.R., as from February 26.

Mr. R. W. Taylor has been confirmed as Deputy Chief Engineer, E.B.R., in a provisionally permanent capacity.

Mr. E. B. N. Taylor has been promoted Deputy Chief Engineer, State Railways, in a provisionally permanent capacity.

Mr. P. G. Shah resumed charge of his duties as Deputy Chief Accounts Officer, G.I.P.R., as from March 12.

Mr. F. F. Parish on return from leave has been appointed to officiate as Deputy Chief Accounts Officer, G.I.P.R., as from March 26.

Mr. G. St. G. Higginson, who, as recorded in our issue of May 7, has been appointed Commercial Traffic Manager, Bengal-Nagpur Railway, joined that system as an Assistant Traffic Superintendent in October, 1911. He was promoted to act as District Traffic Superintendent in 1918, and was confirmed in that post in 1923. After having been in charge of

Mr. G. St. G. Higginson,
Appointed Commercial Traffic Manager, Bengal-Nagpur Railway

several districts he was transferred to the headquarters office of the B.-N. Railway at Garden Reach as Joint Secretary to the Agent in 1927. In the same year he was appointed Statistical Officer. Mr. Higginson was promoted to act as Superintendent, Claims, in 1928, and acted as Superintendent, Rates and Development, in 1930. In January, 1933, he assisted the Pope Committee to investigate measures of economy. On completion of the Pope Committee's work he returned to the Bengal-Nagpur Railway as Deputy Manager, Organisation, in 1933. The same year he was confirmed as a Superintendent in the Commercial Department, and returned to the Commercial Department in 1934 as Superintendent, General, from which post he has now taken over charge as Commercial Traffic Manager of the B.-N. Railway from Mr. E. C. J. Gahan, who has proceeded on leave preparatory to retirement.

We regret to record the death on June 17, at the age of 76, of Mr. T. J. Spooner, a nephew of the late C. E. Spooner, of Portmadoc, who introduced steam locomotives on the Festiniog Railway, of which he was the Engineer for some years, and was a prominent advocate of narrow gauge railways in the seventies and eighties. After serving under his uncle on that railway,

Mr. T. J. Spooner went to India in 1884 and assisted in the construction of the Darjeeling Railway, to which Mr. C. E. Spooner was Consultant Engineer, and then held appointments on the Assam-Bengal, Indian Midland, and Bhavnagar-Gondal Railways. He became an Assistant Engineer for the construction of the Uganda Railway in 1898, returning to India four years later, and joining the G.I.P. Railway for a time. In 1903 Mr. Spooner joined the Southern Mahratta Railway, and became a District Engineer, retiring in 1920.

We regret to record the death at Hove on June 4 of Mr. Douglas Egerton Keatinge, formerly Chief Storekeeper, Indian State Railways.

Institute of Transport Visit to Germany

As we announced in our special article on German railways last week, the Institute of Transport is this year substituting a visit to Germany for its customary annual congress. Members leave London tomorrow, and will visit Berlin, Nuremburg, Munich, Frankfort, Wiesbaden, Coblence, and Cologne, returning to London on July 12. A special train will be at the disposal of the party for all rail travel in Germany. Numerous sightseeing excursions have been arranged, in addition to visiting places of transport interest. Among those taking part in the visit, to be led by the President, Sir Alfred Read, are the following:—

Messrs. W. F. D. Allison, formerly Chief Mechanical Engineer, Tanganyika Railways; A. M. Baird, Resident Engineer, Southern Railway; C. Bentham, Chairman, Henry Simon Limited; J. T. P. Beresford, Beresford, Caddy & Pemberton Limited, haulage contractors, Stoke-on-Trent; Col. C. F. Birney, D.S.O., formerly General Manager, Rhodesia Railways; Messrs. R. Blackaby, Illinois Central System (London office); W. C. Bostock, formerly Deputy General Manager, Nigerian Railway; J. H. Bowyer, L.M.S.R.; W. P. Bradbury, O.B.E., Assistant to Chief Commercial Manager, L.M.S.R.; E. D. Brant, Assistant Secretary, Railway Research Service; J. C. H. Brash, L.M.S.R.; Lt.-Col. P. M. Brooke-Hitching; Messrs. J. L. Broughton-Thompson; W. G. Burt.

Messrs. A. E. Cannon, Director and General Manager, Southdown Motor Services; H. E. Cartwright, L.N.E.R.; H. R. Caulfield-Giles, Transport and Traffic Manager, Newton, Chambers & Co. Ltd.; P. J. Chilcott, L.M.S.R.; E. C. Cox, C.V.O., C.B.E., formerly Traffic Manager, Southern Railway; W. S. Creighton, L.M.S.R.; A. G. Denniss, Chief Traffic Manager, N.S.W. Government Railways.

Messrs. A. A. Ewing, General Manager, Shanghai Electric Construction Co. Ltd.; E. Falconer, Goods Terminal Superintendent, L.M.S.R.; A. Feirn, Assistant, Accountant's Department, Ministry of Transport; A. J. Fletcher, L.M.S.R.; J. E. A. Foreman, G.W.R.; W. H. Gaunt, O.B.E., Distribution Manager, J. Lyons & Co. Ltd.; D. M. Gracie, M.B.E., District Superintendent (Leeds), L.N.E.R.; P. E. R. Graefe, Secretary and Commercial Manager, Maidstone & District Motor Services Limited; W. Henderson Gray, Consulting Engineer; E. W. Greenacre, Royal Mail Lines Limited; H. R. Griffiths, O.B.E., formerly Divisional Superintendent, G.W.R.; A. G. Grundy, Transport Manager, Stalybridge, Hyde, Mossley & Dukinfield Tramways and Electricity Board.

Messrs. D. Halliwell, M.B.E., formerly Assistant to Divisional General Superintendent (Western), L.M.S.R.; E. B. Hassall, formerly Personal Assistant to Vice-President, L.M.S.R.; A. Hastie, Transport Superintendent, Edmundson's Electricity Corporation Limited; Sir Harold Hartley, C.B.E., M.C., F.R.S., Vice-President and Director of Scientific Research, L.M.S.R.; Messrs. W. T. Hall; G. W. Hayter, O.B.E., Chief Engineer and General Manager, Northern General Transport Co. Ltd.; T. Graham Homer, General Manager, Thames Valley Traction Co. Ltd.; T. J. Graham Homer, Thames Valley Traction Co. Ltd.; A. Howell, Secretary and Manager, T. Roddam, Dent & Son Limited (Middlesbrough); E. B. Hutchinson, formerly Chairman and Managing Director, United Automobile Services Limited; A. C. W. Impey, Transport Superintendent, Dorman, Long & Co. Ltd.; S. Iredale, Port of Preston; J. V. Ingram, South African Railways and Harbours; R. W. Johnson, M.C., Secretary, Sugar Association of Lancashire Limited; R. R. Joll, Southern Railway.

Messrs. J. A. Kay, Chairman and Managing Director, Transport (1910) Limited, and Editor, The Railway Gazette; R. Kelso, Director, General Steam Navigation Co. Ltd.; K. A. Kindon, L.N.E.R.; C. F. King, Traffic Manager, Bryant & May Limited; E. A. Kirby, Transport Officer, City of Birmingham Electric Supply Department; A. E. Kirkus, O.B.E., Director of Statistics, Ministry of Transport.

Messrs. D. R. Lamb, Managing Editor and Director, *Modern Transport*; R. Leslie, London Manager and Secretary, Central Argentine Railway; W. B. Livesey, Managing Director, Livesey's Motors Limited, Blackburn; R. A. Long, L.N.E.R.

Mr. J. McDonnell, Assistant General Manager, Birmingham Corporation Tramway and Omnibus Department; Brig.-Gen. Sir H. Osborne Mance, K.B.E., C.B., C.M.G., D.S.O., formerly British Director on the Board of the German Railway Company; Messrs. A. Masterton, L.N.E.R.; W. J. I. Matthews, G.W.R.; Lt.-Col. H. H. Mauldin, Superintendent (Eastern Section), L.N.E.R.; Messrs. J. G. Merriweather, General Superintendent, Ribble Navigation; J. G. Milne, L.M.S.R.; J. W. Mitchell, Transport Superintendent, Carr & Co. Ltd.; H. J. Moscrip, M.B.E., formerly Assistant General Manager, Tyne Improvement Commission; J. C. Moth, Director, Trent Motor Traction Company; C. J. Murfit, O.B.E., Joint General Manager, East Kent Road Car Co. Ltd.; E. E. Northcott, Goods Agent (Exeter Central), Southern Railway; J. O'Leary, Great Southern Railways, Ireland.

Messrs. A. R. Palser, London Transport; A. J. Pearson, Personal Assistant to Vice-President, L.M.S.R.; J. Pike, O.B.E., formerly Goods Commercial Manager, L.M.S.R.; P. F. Pike, Commercial Assistant (Transport Department), Imperial Chemical Industries Limited; R. H. Pitts, O.B.E., Chief Stores Superintendent London Transport; W. H. J. Pyne, Assistant Transportation Superintendent, Great Indian Peninsula Railway.

Messrs. V. Radford, Assistant to Chief Accountant, L.M.S.R.; J. N. Robinson, L.M.S.R.; D. Ross-Johnson, C.B.E., formerly General Manager and Secretary, Port of Bristol Authority; A. W. Satchell, L.N.E.R.; S. R. Simms, Kenya & Uganda Railways and Harbours; A. Whitcomb Smith, General Manager and Engineer, West Bromwich Corporation Transport Department; Sir Josiah C. Stamp, G.C.B., G.B.E., President of Executive and Chairman, L.M.S.R.; Mr. E. C. Stevens, The Borough Services Limited, Southend-on-Sea.

Messrs. E. Taylor, Chief Accountant, L.M.S.R.; A. Taylor, Stockport Corporation Transport Department; T. E. Thomas, General Manager of Road Transport, London Transport; V. L. Thompson, Deputy Traffic Manager (Transportation), Assam-Bengal Railway; E. E. Threadkell, L.N.E.R.; H. N. Trye, Traffic Auditor, London Transport; G. A. Venter, South African Railways and Harbours; W. T. Venton, formerly Divisional Commercial Manager (Western), Southern Railway; H. Vernon, L.M.S.R.

Mr. F. Oswald Waite, Southern Railway; Sir Herbert Walker, K.C.B., General Manager, Southern Railway; Messrs. J. Wardle, formerly Assistant Commercial Manager, London Transport; W. E. Watts, L.M.S.R.; A. J. Webb, Assistant Divisional Superintendent (Railways), London Transport; M. P. C. Went, Rhodesia Railways; R. M. Wheatley, L.N.E.R.; E. G. Whitaker, General Manager, A. J. Gupwell Limited; P. H. Wood, Birmingham and Midland Motor Omnibus Co. Ltd.; E. R. Woollatt, G.W.R.; A. Winter Gray, Secretary of the Institute of Transport.

The late Lt.-Colonel Dyke Acland, C.B.E., whose death on March 22 was recorded in The Railway Gazette of April 9, left estate valued at £192,133.

The L.M.S.R. announces that Miss M. T. Chisholm has been appointed Divisional Lady Welfare Supervisor, Northern Division, Glasgow, and will take up her duties on the 28th of this month.

Sir Owen Beasley, who has been Chief Justice of the High Court, Madras, since June, 1929, is to retire from that position on July 2. Sir Owen is the son of the late Sir Ammon Beasley, formerly of the Great Western Railway, and subsequently General Manager, and then Deputy Chairman of the Taff Vale Railway. Sir Owen Beasley, who was born in 1877, was educated at Westminster School and Jesus College, Cambridge. Called to the Bar at the Inner Temple in 1902, he was concerned in several railway Bills before committees of the House of Lords and the House of Commons, in particular some of great interest to the South Wales railways and the G.W.R.; *i.e.*, the fights for the Sirhowy Valley coal, and also before the committees between the Taff Vale and the Cardiff Railways, relating to Treforest Junction. He was Junior Counsel for the Taff Vale Railway in the Bills of 1909 for fusion with the Cardiff Railway and the Rhymney Railway. The former Bill being rejected after a long fight, the latter was not proceeded with. He also appeared as Counsel for the G.W.R. in many criminal cases on the South Wales circuit, and for the Taff Vale Railway in many cases in the Civil Courts. After the war, in which he served with distinction from 1914 to 1919, Sir Owen Beasley was appointed a puisne judge of the High Court, Rangoon, in 1923, and subsequently to the same office in the High Court, Madras, a year later, becoming Chief Justice of that Court in 1929.

The funeral of the late Mr. Richard Brown, Assistant Accountant, L.N.E.R., whose death on June 15 we recorded last week, took place at Golders Green Crematorium on June 18. The L.N.E.R. was represented by:—

Mr. James McLaren (Secretary), Mr. C. H. Newton (Divisional General Manager, Southern Area), Mr. G. Sutherland (Chief Accountant), Mr. G. N. Rhodes (Divisional Accountant, Southern Area), Mr. H. Laird (Divisional Accountant, North Eastern Area), Mr. D. Sayer (Locomotive Accountant, Southern Area), Mr. J. C. L. Train (Assistant Engineer, Maintenance, Southern Area), Mr. H. Halliday (Principal Assistant, Staff, to Chief General Manager), Mr. W. Philip (Divisional Accountant, Scottish Area), Mr. J. Inglis (Locomotive Accountant, Scottish Area).

Representatives of other railways were:—

Messrs. G. Morton and E. Wilson (L.M.S.R.); E. F. Marsh (Southern Railway); H. Forth and T. B. Cox (G.W.R.); H. N. Trye (London Transport); and E. Paynter and J. C. Bowyer (Railway Clearing House).

East Indian Railway Officers' Dinner

The 39th East Indian Railway Officers' annual dinner was held at the Trocadero Restaurant last Friday, Mr. A. V. Venables, M.C., presiding. Others present were:—

Sir James Duncan Elliot, Sir Clement Hindley, Sir Seymour Tritton, Col. A. W. Rendell, Col. J. Robertson, Lt.-Col. G. Huddleston, Capt. E. W. Huddleston, Capt. W. B. Huddleston, Dr. B. W. Holmes; Messrs. A. S. Bailey, C. J. H. Bolton, F. S. Bond, W. H. Barnard, A. C. Carr, W. C. Cartland, H. A. Collett, T. G. Crichton, W. A. Denby, J. T. Derry, A. Devon, R. Dormer, S. T. Dutton, H. G. Emmerson, C. Eyers, J. Fitzpatrick, A. W. Goldsack, A. R. Gundry, P. Hackforth, H. W. C. Halpin, E. J. Harris, J. Hecquet, E. Heysham, J. H. Horniman, G. R. G. Huddleston, H. B. Huddleston, S. A. Huggins, E. E. Joy, L. A. Lewis, E. H. N. Lowther, R. E. L. Maunsell, E. G. Moyes, P. G. Murray, W. E. Pincombe, H. E. Presswell, B. V. Radley, W. S. Rashleigh, G. S. Robertson, C. F. Satow, B. Severs, F. A. Sherriff, A. C. M. Slater, W. J. Tomes, C. O. Tonkinson, J. Tritton, A. R. Ubsdell, H. C. Wallace, W. G. Wheatley, R. J. L. Whitby, T. A. White, C. G. Young, M. C. G. Young, and H. H. Yule.

The Chairman, proposing the toast of "The East Indian Railway" in a most amusing speech, said that as he had not been elected to the chair at last year's dinner, he was only "officiating chairman in anticipation of sanction." One of his regrets, when he retired recently was, that he had not seen the completion of the rebuilding of Jamalpur, which was so seriously damaged in the earthquake of January 15, 1934. The new workshops, he said, compared with anything else in the world, and the new quarters also contributed to a splendid city. Turning to recent E.I.R. events, Mr. Venables mentioned that February this year saw the record figure of 5,400 wagons loaded in a day. At the recent Lucknow Exhibition the E.I.R. had obtained the first prize and gold medal for its exhibit. Finally he announced that in two months' time five air-conditioned upper-class coaches would be running in an E.I.R. mail train.

Mr. Venables also proposed the health of "The Guests," to which Sir Seymour Tritton replied. The final toast of the evening was "Sammy Dutton" (the popular and efficient Secretary of the dinner), which was responded to with enthusiasm; Mr. Dutton suitably replied. The official business closed with the election of Mr. A. Devon as Chairman of the 1938 dinner, and a very pleasant evening concluded in the usual informal manner.

SCHOOLBOY ELECTROCUTED BY LIVE RAIL.—At the inquest last Friday, on George Edward Bew, a four-year old schoolboy, who was electrocuted while walking on the Southern Railway lines at Denmark Hill, the Coroner (Mr. A. Douglas Cowburn) said that the railway appeared to have adopted all reasonable precautions to keep people out. Bew had climbed over a 4-ft. 2-in. fence covered with barbed wire, and then dropped over 6 ft. on to the railway.

The Old Centralians' Annual Dinner

A distinguished company of members and guests of the Old Centralians—the old students' organisation of the City and Guilds (Engineering) College—assembled at the Connaught Rooms on Friday, June 11, the occasion of their annual dinner. Mr. E. G. Walker presided, and the company included:—

Sir John Thornycroft (President of the Institution of Mechanical Engineers), Mr. H. T. Young (President of the Institution of Electrical Engineers), Mr. S. B. Donkin (President-elect of the Institution of Civil Engineers), Mr. Asa Binns (Chief Engineer, Port of London Authority), Dr. C. H. Deach (Head of the Department of Metallurgy, National Physical Laboratory), Dr. C. H. Lander (Dean of the College), Sir Henry Tizard (Rector of the Imperial College of Science and Technology), and Mr. G. Stephenson (Secretary of the City and Guilds of London Institute).

Sir John Thornycroft proposed the toast of "The City and Guilds College," coupled with the name of the Dean. Dr. C. H. Lander responded, and referred to a new course of chemical engineering which was being instituted. Mr. D. F. Orchard (Chairman of the City and Guilds Engineering Society) responding to the toast of "The Guests," which had been given by Mr. L. J. Cardew Wood, expressed his society's great appreciation of the kindly interest taken in its activities by the Old Centralians. The presence of Old Centralians at the meetings of the society was welcomed, for it maintained and strengthened the lively interest between the two bodies, an interest in which the present students had all to gain and nothing to lose.

Mr. Asa Binns proposing a toast to the Association of Old Centralians, with which he coupled the name of the President, Mr. Walker, recalled that he had been associated with Mr. Walker since the latter had taken his first job after leaving the Central Technical College. Mr. Binns recalled the names of some of the Professors at the Central—Professor Unwin, Professor Sylvanus P. Thompson, John Perry (who had first persuaded engineers to recognise that the calculus existed), and so on. The President (Mr. Walker), in his response, commented on the fact that Mr. Binns had been appointed as the representative of the Institution of Mechanical Engineers on the Governing Body of the Imperial College. That, he said, was a matter for congratulation. There were many men of note on that governing body, but engineers were still in the minority.

A New Chapter in the History of Kitson's

An interesting development has just taken place in the history of the firm of Kitson's the locomotive engineers of Leeds. This firm, founded by James Kitson over a hundred years ago and converted into a limited company in 1899, has made railway locomotives for more than a century. Its first order was for six locomotives for the old Liverpool and Manchester Railway. Of these, the *Lion* which was replaced on the line and utilised in the recent film of the reign of Queen Victoria, is permanently on display at Lime Street station, Liverpool. Since that first order up to the present day, the firm has built locomotives for use in all parts of the world. Prior to the slump in the heavy engineering industry in recent years, the firm enjoyed a successful career, but owing to the serious trade decline afterwards experienced and the inevitable withdrawal of capital as the older members died out, the firm placed itself in the hands of the debenture holders, and in 1934 Sir Leonard Coates was appointed receiver on their behalf.

Messrs. Kinloch & Co., merchant bankers of 118, Old Broad Street have now provided further working capital for the company and acquired a controlling interest. The receivership has been brought to an end, and the company is now provided with adequate resources to carry on its business. The Directors are Sir Basil Tangye, Mr. A. D. Kinloch, Mr. H. M. Gulland, Mr. Peel Fletcher, and Colonel Kitson Clark who remains on the Board. It is the intention of the present directors to retain as far as possible the existing staff and organisation with a view to maintaining the traditions of the firm built up over the past century.

Exports of Railway Material from the United Kingdom in May

	May, 1937	May, 1936	Five Months Ending May, 1937	Five Months Ending May, 1936
	£	£	£	£
Locomotives, rail	28,480	180,271	466,976	641,310
Carriages and wagons	283,278	80,461	1,184,219	703,938
Rails, steel	120,649	96,823	434,230	370,933
Wheels, sleepers, fishplates and miscellaneous materials	120,640	133,549	538,099	416,203

Locomotive and rail exports included the following:—

	Locomotives May, 1937	Locomotives May, 1936	Rails May, 1937	Rails May, 1936
	£	£	£	£
Argentina	20,155	5,351	1,811	2,301
Union of South Africa	—*	—*	17,062	39,944
British India	14,270	33,105	12,877	9,100

* Figures not available

Review of Standard and Exceptional Charges

Main Line Railway Companies' Application for Certain Increases in Fares and Rates. If Sanctioned these will come into Force on October 1 next

The Railway Rates Tribunal continued on June 17 its annual review of the standard and exceptional charges of the four amalgamated railway companies. Sir William V. Wood, Vice-President, L.M.S.R., continued his financial evidence in support of the application of the four companies for an increase of approximately 5 per cent. in rates and charges. Dealing with the increase in traffics during the present year he said that at the moment the increase in coal was about 7½ per cent.; for all traffics it was about 4·7 per cent., and he had no reason to expect that that 4·7 per cent. would not continue for the whole year. He was sure that certain traffics could stand very much more than a 5 per cent. increase in rates, as for instance, export coal, which was about 70 per cent. below the standard. He assumed the price of coal would increase because of his company's experience in buying it. The traffic in vegetables had fallen by 460,000 tons compared with 1935. The actual net amount payable in respect of the transport of coal had been increased during this year by the amendment of the freight rebates scheme, but the rate had not been increased. The rebate for 1936 on the average was 8·05, and today it was 6·26. Third-class season tickets receipts had shown an increase of 1½ per cent. as between 1935 and 1936 whereas workmen's tickets had increased 5 per cent. A large number of workmen had been transferring from seasons to workmen's tickets ever since 1928, because they were cheaper. The £10,750,000 which the main line railways received out of the London Passenger Transport Pool constituted 20 per cent. of their passenger receipts. The companies were not making any proposal regarding London passengers at the moment. Cheap fares had had a material effect in making the passenger revenue greater than it otherwise would have been. He would not agree that preferential treatment might be justified in the case of Southend.

Sir Ralph L. Wedgwood, Chief General Manager, L.N.E.R., gave evidence on Friday, June 18, as to the policy of the four companies regarding rates and charges. Every year since the Appointed Day the companies had failed to earn their standard revenue. The deficiency reached its maximum in 1932, when it totalled £24,500,000. Since that time there had been an improvement in railway net revenue, but the deficiency in 1936 was still more than £15,500,000. Until this year the companies had informed the tribunal that they did not think any increase in charges would bring them any increase in revenue. A material improvement had set in in the second half of 1933, and each subsequent year had shown an increase in traffic receipts and net revenue over the preceding year. This improvement was attributable to the gradual betterment of the trade position of the country as a whole. In 1934 and 1935 the companies felt that the imposition of a general increase of charges might have had the effect of discouraging the trade revival which was then beginning to disclose itself, and on that account there were grave chances that it would not yield an increase in revenue. Since 1935 there had been a very marked further improvement in trade, particularly during the first months of this year. That had affected particularly the heavy industries, such as coal, iron and steel, and shipbuilding, and in the opinion of the railway companies justified a more optimistic view of the future. The companies had come to the conclusion that a moderate increase in charges at the present time would materially improve their net revenue without prejudicing the favourable trend in trade and industry. Looking at the position as a whole they saw that cost of manufacture had increased in nearly all directions, the prices of raw material were rising, the price of coal had gone up, and the cost of labour had also risen. Yet, in spite of that increase in nearly all the elements of the cost of manufacture, the total production of the country had increased, and was increasing, and it did not appear that these increases of charge had had any effect in discouraging production or diminishing trade or industry.

They had come to the conclusion that the increase to be suggested to the tribunal should be one at 5 per cent., to apply to all descriptions of traffic. There was none of the main descriptions of traffic where an increase of 5 per cent. would not bring in some increase of revenue. Affecting equally all classes of industry and all classes of traffic, it would be least likely to give rise to special hostile opposition.

In merchandise and coal rates it was proposed that the minimum increase should be 1d. On passenger fares it was proposed to put a minimum increase of ½d. The increase would be at the rate of ½d. on fares up to 11½d., one penny on fares between 1s. and 2s. 5d., and so on, in proportion. On small parcels by passenger train they proposed to increase by ½d. up to 11½d., and after that to apply the 5 per cent. with a minimum of 1d., which would bring the charge to the same scale as merchandise generally. There would be no increase in the present charge of 1d. for splitting consignments into different portions at destination. The average receipt per ton for coal of all companies in 1936 was 3s. 8d. An increase of 5 per cent. on 3s. 8d. represented something less than 2½d. on the average. The average shipment coal rate on the L.N.E.R. during 1936 was 2s. 3d. a ton, and an increase of 5 per cent., or 1½d. on the average, would, he thought, have no effect at all in reducing the volume of coal shipments. A large tonnage of agricultural traffic had been diverted to road for the past few years. The effect of the increased charges on this traffic might be to give the railways more revenue than they would otherwise have, though less than they were getting at present. Because of the increased prosperity in the country, he did not think the passenger traffic would be affected by the increased fares. Assuming there was no loss of traffic, it was estimated that the four companies would receive an increase of £7,500,000 yearly through the 5 per cent., of which the apportionments would be :—to the L.N.E.R., £2,300,000; L.M.S.R., £3,200,000 ; Great Western, £1,300,000 ; and Southern, £700,000. These amounts would not take into account sums received from the London Transport pool.

Sir Ralph Wedgwood continuing his evidence on Monday, June 21, said that the total gross receipts of the four group companies for 1936 were £162,384,907, and the estimated figure for 1937 was £169,109,000. If the increase claimed were granted, a figure of £174,718,000 was estimated for the first complete year of the new charges. Actual working expenses in 1936 were £126,654,346, and it was estimated that the expenditure under the new charges would be £133,654,346, yielding a net revenue for the year of £41,064,154. This would still leave a deficiency of £10,294,941 on standard revenue and allowances. The apportionment of the new estimated net revenue would be :—£11,207,508 to the L.N.E.R. ; £15,936,999 to the L.M.S.R.; £7,527,859 to the Great Western ; and £6,391,788 to the Southern. In the estimated expenditure no account had been taken of any increased cost which might occur in labour and materials. Sir Ralph Wedgwood's evidence was concluded on Tuesday.

Sir William V. Wood, recalled on Wednesday, June 23, said it was estimated that the companies would have to face an increased annual expenditure in the future of £7,000,000, because of an increase in wages and in the cost of materials, apportioned as to £1,825,000 to the L.N.E.R., £3,175,000 to the L.M.S.R., £1,175,000 to the Great Western, and £825,000 to the Southern. The case for the railway companies was closed, and yesterday the tribunal heard evidence from the opponents.

ELECTRIC TRAINS IN COLLISION NEAR BUDAPEST.—Two suburban electric trains on the Hungarian State Railways came into collision near Budapest, on June 21. One passenger is reported to have been killed, and 48 injured.

QUESTIONS IN PARLIAMENT

Congestion on the Underground

Mr. J. F. E. Crowder (Middlesex, Finchley—U.) on June 2 asked the Minister of Transport whether he had any information as to the extent to which congestion on the underground railways had been reduced during the recent bus strike as a result of many large offices making spread-over arrangements with regard to the hours during which their staffs arrived and left; and whether he proposed to take any steps to encourage the placing of such arrangements on a regular basis.

Dr. Burgin (Minister of Transport): I understand that the peak traffic periods on the railways of the London Passenger Transport Board were extended during the recent omnibus strike, but I have no information as to the extent to which this was due to the action of employers. I would welcome any steps which employers could take to spread passenger traffic more evenly, and would gladly consider any practicable suggestions made to me.

Erection of Railway Stations

Commander Oliver Locker-Lampson (Handsworth—U.) on June 2 asked the Minister of Transport whether he would give assurances that steps would be taken to ensure that railway stations or other buildings where crowds collected were not permitted to be erected so as to cause congestion on by-pass and other roads built at great expense to relieve traffic congestion in and out of great cities.

Dr. Burgin: My department has drawn the attention of highway and other local authorities to the powers conferred upon them by the Restriction of Ribbon Development Act, 1935, to prevent or mitigate the type of development my hon. and gallant Friend has in mind, and I shall do all I can to encourage them to make wise use of those powers.

Accident to Platelayers

Mr. A. Short (Yorkshire W.R., Doncaster—Lab.) on June 16 asked the Minister of Transport whether he could make any statement respecting an accident on June 8 to platelayers on the London & North Eastern Railway at Joan Croft Junction, near Doncaster; and whether a look-out man was employed.

Dr. Burgin (Minister of Transport): I have at once ordered an inquiry to be held into the circumstances attending this accident. Until I receive the Inspecting Officer's report, I am unable to make any statement.

South Lancashire Electrification Schemes

Mr. A. E. L. Chorlton (Bury—U.) on June 16 asked the Minister of Transport whether he was able to report the decision of the railway companies to electrify the railways of South Lancashire.

Dr. Burgin: I understand that neither of the two main line railway companies concerned has under consideration at the present time any further electrification schemes in South Lancashire.

Fatal Accidents near Carlisle

Brigadier-General Spears (Carlisle—U) on June 16 asked the Minister of Transport whether he was aware that within the last three years three fatal accidents had occurred on a 10-mile length of railway in the neighbourhood of Carlisle owing to the narrowness of the bridges on this line; and whether he would take immediate steps to ensure that the necessary steps were taken to prevent similar accidents.

Dr. Burgin: I am aware that three accidents have occurred on the Maryport and Carlisle section of the London Midland & Scottish Railway owing to passengers leaning out of windows. On this line and other old lines, there are a number of bridges where the clearance is less than would now be required for new construction. I have no power to compel the company to reconstruct the bridges or to provide narrower rolling stock than is now in use. Warning notices are exhibited in carriages.

Charing Cross Bridge

Mr. J. J. Lawson (Chester-le-Street—Lab.) on June 16 asked the Minister of Transport if he could state the estimated grant from the Road Fund that would be necessary if his offer in respect to Charing Cross bridge were accepted.

Dr. Burgin: Until a detailed scheme and estimate have been prepared and agreed it is not possible to state the amount of grant which might be payable from the Road Fund.

Cheaper Travelling Facilities

Mr. W. T. Kelly (Rochdale—Lab.) asked the Minister of Transport what reply had recently been made by the London Passenger Transport Board to the appeal made for cheaper fares for children placed in work in London and the neighbourhood.

Mr. Ernest Brown (Minister of Labour), who had been asked to reply, said: I understand that the question of cheaper travelling facilities for young persons in employment in London has again been reviewed by the railway companies and the London Passenger Transport Board, but they are unable to agree to any extension of the existing facilities.

Live Rail Accidents

Brigadier-General Clifton Brown (Newbury—U) on June 16 asked the Minister of Transport whether he was aware that two fatal accidents had occurred in the last ten days from contact with the live rail on the Southern Railway, one near Brighton and one near Mitcham; and what steps was he taking to see that the Southern Railway was providing proper fences or protection against this new danger.

Mr. Leslie Burgin: I am in communication with the railway company regarding the circumstances attending these accidents and am awaiting the result of my inquiries.

Smoke Abatement

Mr. B. V. Kirby (Everton—Lab.) asked the Minister of Health whether the London Midland & Scottish Railway Company had yet obtained the report on measures that could be taken in co-operation with the Health Committee of Liverpool to abate the serious smoke nuisance in the centre of Liverpool.

Sir Kingsley Wood (Minister of Health) wrote in reply: I am afraid that the hon. Member is under some misapprehension. The report mentioned in my answer to his earlier question is being obtained by the railway company for their own guidance, and is not intended for publication. I am informed that the matter is being considered by the technical staffs of the company and the city in co-operation.

Manchester to Rochdale Railway

Mr. W. T. Kelly (Rochdale—Lab.) on June 23 asked the Minister of Transport what was the position as to the electrification of the railway from Manchester to Rochdale.

Dr. Leslie Burgin (Minister of Transport): I would refer the hon. Member to the reply which I gave to a question by my hon. Friend, the Member for Bury, on June 16.

Overcrowding on the Underground

Mr. H. Day (Southwark, Central—Lab.) on June 23 asked the Minister of Transport, whether his attention had been recently drawn to the overcrowding that occurred on underground trains between the hours of 6.30 a.m. and 9 a.m., and 5.30 p.m. and 6.30 p.m., during which times many trains were so overcrowded that passengers found a difficulty in obtaining standing room on the platform between the carriages; and would he make representations to the board controlling this railway system with a view to securing more adequate accommodation for the travelling public.

Dr. Leslie Burgin: I have recently been in communication with the London Passenger Transport Board, who inform me that the accommodation during the peak hours on their railways is the maximum possible in present circumstances but that they have in hand schemes of railway improvements providing for more frequent trains of greater capacity upon certain of their lines where congestion is most acute. The Board consider that, apart from this, the remedy must be in the staggering of working hours, or in other arrangements for spreading the peak traffics over longer periods.

Mr. E. Shinwell (Seaham—Lab.): May I ask the right hon. Gentleman whether this necessary reorganisation is to be undertaken on the early advice of the Government?

Mr. Burgin: On June 2 a question was asked on this matter, when it was stated that any steps which employers could take to spread passenger traffic would gladly be considered.

RAILWAY AND OTHER MEETINGS

British Electric Traction Co. Ltd.

The forty-first ordinary general meeting of the British Electric Traction Co. Ltd. was held on June 18 at Winchester House, London, E.C., Mr. J. S. Austen, Chairman of the company, presiding. The Secretary (Mr. Thomas Bower) read the notice convening the meeting and the auditors' report.

The Chairman, in moving the adoption of the report and accounts, said that last year he had told stockholders that in the two previous years they had increased their income by £70,000, or an average of £35,000 a year, and that they could not keep up that rate of increase, but he found that in the year under review they had increased it by £60,000.

Some time ago, when the price of the B.E.T. deferred stock was somewhere about 1,400, which it was at the present moment, he had asked himself whether he thought the stock was worth its present price. He had gone into it very carefully, had made the necessary calculations, and had come to the conclusion that their stock was worth 1,400. He asked stockholders not to question too closely what was exactly in his mind when he said that. He certainly did not mean that he valued it as worth only 1,400, because he knew very well that it was worth a great deal more than that. Further, he did not mean that the Stock Exchange was always going to value it at that amount, because Stock Exchange valuations were dependent on so many things that had nothing whatever to do with the company.

It was now 9 years since they had declared their first bonus on their deferred stock and in that year the surplus income available for the stock had been £20,000. For the year under review it was £227,000. Again, they were able to put £138,000 to undivided profits account and in addition there was also the sum which they declared as dividend but did so in the shape of stock. Adding the two sums together, they were putting back into the company practically £200,000 of new money.

Dealing with the McGowan Report, the Chairman said that concerning the main purport of the report, which was the unification of electric supply, he had nothing to say, but he had something to say about the proposals, because, if they were carried out, many thousands of pounds' worth of assets would meet with confiscation. No doubt some objection might be taken to the word, but it was near enough for him and, if stockholders looked at the facts, he thought it would be near enough for them.

They owned a number of electrical undertakings and they had constructed them under the protection of an Act of Parliament which had said that, in the event of their being bought up, they would be bought up on certain terms. They regarded that Act of Parliament as an agreement. It came as a shock to them when they found that that Act of Parliament, which embodied an agreement, was going to be torn up as if it were a scrap of paper. It was true they were to get some compensation for it, but that compensation was, in effect, to be fixed by the Electricity Commission, which was, to all intents and purposes, responsible for the scheme. The scheme conferred on the Electricity Commissioners an amount of bureaucratic control which had yet to be improved upon. They were appearing to act as planners of the scheme, judges, and valuers, and were to have a final decision on practically every detail of the scheme.

Further than that, the present efficient management of the various electricity undertakings was to be scrapped and the management in future would be appointed by the Minister of Transport in consultation with the local authorities. That could only mean jobbery, and jobbery meant inefficiency, and inefficiency meant that in the end they would have to pay more for their electricity, which, however, did not bother him that day.

In these times it did not do to look too far forward, so, taking only the present year, they felt satisfied that they would have an increase and that that increase would be large enough to cover what they had to pay under the new duty. He would like to say that he hoped to goodness they would change the name of the duty because, if they did not, they would always associate the name of their present Premier with failure. He would also like to say that in giving the estimated value of their deferred stock, he had had that melancholy prognostication already in his mind.

The report was unanimously adopted, and the proceedings terminated with a hearty vote of thanks to the Chairman and directors.

The Northern Belle in Coronation Year

The Coronation year itinerary of the L.N.E.R. cruising train, the Northern Belle, again led through Scotland to the Highlands, and, in combination with motorcoach trips and steamer excursions, introduced travellers to most of the best known scenery in that part of the country. With the co-operation of the L.M.S.R., the Northern Belle was able to extend its route to Inverness, and return to Perth over the former Highland Railway. A fourteen-coach train, including six sleeping cars, was used for the cruise, and was divided into night and day portions as required according to the usual practice. There were two cruises this year, leaving London on June 4 and June 18, both following the same route and subject to the same working arrangements.

The complete train left King's Cross on Friday evening at 7.40 p.m. for Aberdeen, reached at 9.35 a.m. on Saturday morning. While the day coaches made the day trip to Ballater, the sleeping cars remained at Aberdeen for occupation that night. The next morning (Sunday) the day coaches left for Elgin, and thence via the L.M.S.R. to Inverness, followed by the empty sleeping cars. Both parts were combined at Inverness, preparatory to the complete train being worked southwards by the L.M.S.R. to Blair Atholl on Monday. Passengers alighted at Blair Atholl, and the empty train continued to Perth for cleaning, and then on to Glenfarg to pick up the passengers again. Dinner was taken on the train, after which the day coaches were sent to Craigentinny carriage sidings, Edinburgh, for servicing. Passengers spent the night in the sleeping cars at Glenfarg.

Early on Tuesday the night portion proceeded from Glenfarg to Dalmeny, there picking up the day coaches, and the combined train ran to Balloch pier (Loch Lomond). Here passengers joined the steamer for Ardlui. The sleeping cars having been sent on ahead to Fort William, the day portion ran empty to Ardlui to pick up the passengers, and then proceeded to Fort William itself. In the afternoon, it ran to Mallaig and back, stopping on Glenfinnan viaduct to allow passengers to enjoy the view. The night was spent at Fort William.

The two parts of the train ran independently from Fort William to Cowlairs (for servicing) on Wednesday, the down portion setting down passengers at Crianlarich for a motor drive through the Trossachs to Aberfoyle. Here the day carriages were waiting, and, proceeding to Corstorphine for the night, picked up the sleeping cars again at Lenizie junction. During Thursday, which passengers spent in Edinburgh and neighbourhood, the train was again serviced and cleaned at Craigentinny sidings. Passengers slept on the train, which left Edinburgh at 12.5 a.m. on Friday, arriving at King's Cross at 10.45 a.m.

Forthcoming Events

June 26-July 11.—Institute of Transport, in Germany. Congress.
July 3-8.—Permanent Way Institution Summer Convention, Southport.

Forthcoming Meetings

June 30 (*Wed.*).—**Mexican Railway Co. Ltd.** (Ordinary General), Winchester House, Old Broad Street, E.C.2., at 2.30 p.m.

NOTES AND NEWS

Progress of Railway Bills.—The London Midland & Scottish Railway Bill was read the third time, with the amendments, in the House of Lords, and passed and returned to the Commons on June 21. A similar procedure was followed with the London & North Eastern Railway Bill on June 22.

Argentine Transandine Railway.—The Argentine Minister of Public Works submitted a Bill to Congress on June 23 providing for the purchase of the British-owned Argentine Transandine Railway. The proposed price is stated to be £750,000.

New London Premises for Broadway Engineering Co. Ltd.—To cater for the increased demand for the machine tools of which the Broadway Engineering Co. Ltd. has sole selling rights in this country, the firm has acquired new premises in Carlisle Road, Hendon, London, N.W.9. These premises, which have a total floor space of 11,000 sq. ft., will be occupied as from July 1.

The Coronation Scot, L.M.S.R., on Exhibition.—The new L.M.S.R. streamlined Pacific No. 6220, *Coronation*, and the nine-coach train for the Coronation Scot London-Glasgow 6½-hr. service to be introduced on July 5, were exhibited at Euston station, on Wednesday and Thursday. Admission was free, but a collection was taken on behalf of the Railway Benevolent Institution.

120-Ft. Rails on the L.M.S.R.—Nearly a mile of rails of the 95-lb. R.B.S. Section, on the down L.M.S.R. Western Division main line immediately south of Hemel Hempstead station, has been relaid with rails in 120-ft. lengths. They have been manufactured by the Skinningrove Iron Company, Saltburn-by-the-Sea, which was also responsible for the 120-ft. 100-lb. rails laid a short time ago in the L.N.E.R. main line at Holme, south of Peterborough (see THE RAILWAY GAZETTE of March 19).

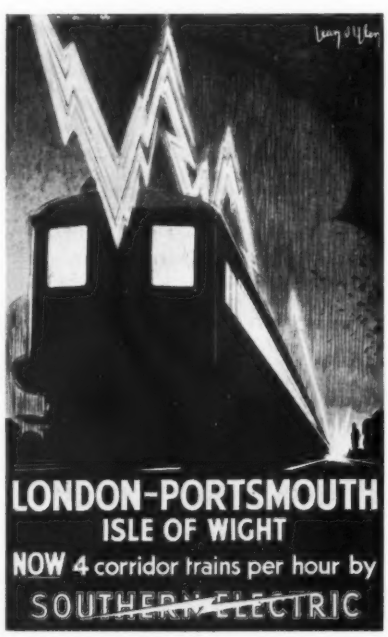
The Sandal and Walton Derailment; Resumed Inquest.—The inquest was concluded on June 10 at Wakefield, before the West Riding Coroner, Mr. C. J. Haworth, on the two persons killed by the derailment at Sandal and Walton station, L.M.S.R., on May 30. Colonel A. C. Trench was present, with Mr. G. A. Challinor, Assistant Divisional Solicitor, for the railway, and Mr. H. Triplett, N.U.R. Evidence was given by Signal Lineman A. H. Styler and Ganger J. S. Cox regarding the removal of bolts from stretcher bars at the points where the last vehicle of the train became derailed, from which it appeared that there had been a misunderstanding between the two, one of whom was said to have acted with excess of zeal. There was no question of work being rushed, as there was plenty of time, but there was the question of divided responsibility, which pointed, it was thought, to a need for co-ordination of control over work of the kind then in hand. The jury returned a verdict of "Misadventure."

L.N.E.R. Pacific Named "Commonwealth of Australia."—At King's Cross on Monday, the Rt. Hon. S. M. Bruce, High Commissioner for Australia, officially gave the name *Commonwealth of Australia* to L.N.E.R. streamlined Pacific No. 4491, the second of the engines for hauling the Coronation London-Edinburgh expresses to be introduced on July 5. Mr. Bruce was supported by Mr. S. G. McFarlane (Official Secretary), and Mr. A. H. K. Weir (Official Secretary for New South Wales). The L.N.E.R. was represented at the ceremony by Mr. William Whitelaw (Chairman) and the following officers :—

Mr. J. McLaren (Secretary), Sir Nigel Gresley (Chief Mechanical Engineer), Messrs. O. Bulleid (Assistant to Chief Mechanical Engineer), C. H. Newton (Divisional General Manager), A. P. Ross (Chief Stores Superintendent), C. Dandridge (Advertising Manager), and O. H. Corble (Assistant to Chief General Manager).

Telegrams were exchanged between Mr. Whitelaw and Lord Gowrie, Governor-General of Australia.

Southern Electric Poster.—It is the custom of the Southern Railway to bring out a striking poster to advertise each of the successive electrification extensions, and that produced for the Portsmouth conversion is shown in the accompanying illustration. It is also reproduced in colour on the cover of our *Electric Traction Supplement* this week. The actual increase in the express service with electrification will be about 100 per cent.



Southern Waiting Room as Picture Gallery.—From Monday last, June 21, the general waiting room at Charing Cross station has housed an exhibition of large original sketches that have been used or will be used by the Southern Railway for posters, and which are on display for the first time. The sketches are of different resorts and towns of France, and also illustrate the various ways and means of travelling to that country. The exhibition closes on July 5.

New G.W.R. Halts.—The Great Western Railway is to construct a new halt at Mickleton, between Campden and Honeybourne, to serve a rural population of 600 living in adjacent villages. On Monday, June 21, a new halt was opened at Dorton, between Brill and Ludgershall station and Ashendon junction (G.W. & G.C. joint line); and on July 5, Furze Platt halt, between Maidenhead and Cookham, will be opened to serve a growing residential area of Maidenhead. (See also p. 1190.)

Navy Week, 1937.—Navy Week will be held this year on July 31, and from August 2 to 7 inclusive, at Plymouth, Portsmouth, and Chatham. In connection with this event, an 18-ft. scale model of the battle cruiser H.M.S. *Repulse* will, between June 29 and July 31, be taken by road on a tour through 102 towns and several thousand villages in England, reaching Bradford in the north and Taunton in the west. The usual elaborate railway arrangements for the convenience of the public wishing to participate in the events have been made.

Floodlighting for L.N.E.R. London Marshalling Yard.—The L.N.E.R. announces that it is to install a modern system of floodlighting at the important goods marshalling yard at Temple Mills, Stratford, E., where there are about 48 miles of sidings with accommodation for approximately 7,000 wagons. Floodlighting without glare will be achieved largely by the use of vertical electrical floodlights, which have been proved extremely successful in operation at the marshalling yards at Mottram, near Manchester, and Hull, both of which have recently been reconstructed by the L.N.E.R. for handling increased traffic.

Platelayers Run Down on L.M.S.R. near Wigan.—The Assistant Deputy County Coroner of Lancaster, Mr. C. Bolton, held an inquest at the Ince Council Offices on June 14 on James Green, a 23-year-old platelayer's labourer. Green was one of a gang of sixteen men who were working on the up fast line at Bamfurlong, L.M.S.R., on June 1, when the Heysham-Euston boat express passed and the men had to leap for their lives. Green was killed instantly and two others were injured. According to the evidence of the subganger there was a cross wind on the day of the accident, and the smoke and steam from a slow train, travelling in the same direction as the express, obscured the up fast line. The look-out man confirmed this and said he did not

give a signal for the slow train as the men were not working on that line, but when he first saw the express it was only a hundred yards away. He shouted and blew his whistle but the men did not seem to hear. He said he blew his whistle when he saw the fast line obscured by smoke and before he saw the express, but evidently the whistle was not heard above the noise of the trains and the wind was blowing the sound away from the men. Mr. W. H. Gyles, District Engineer of the L.M.S.R., said the company was experimenting with a form of Klaxon horn, calculated to give a louder warning. A verdict of "Death by misadventure" was recorded and the jury added "We are sorry that the railway company had not the caution notices out indicating to express drivers that they should slow down."

The Orient Express.—Owing to the increasing demands for accommodation, the Ostend section of the Orient Express is now being run daily, instead of three days a week as heretofore. Passengers leave London (Victoria) at 3 p.m., and Ostend Quay at 8.38 p.m., Vienna being reached at 3.20 p.m. the following afternoon, Budapest at 8.28 p.m., Belgrade at 7.3 on the next morning, and Istanbul 24 hr. later. A through sleeping car is attached to the train daily from Ostend to Budapest, and on Tuesdays, Thursdays and Saturdays from Ostend through to Istanbul; but on every day, by changing at Budapest, passengers can join sleeping cars from there through to both Istanbul and Athens.

L.M.S.R. to Close a North Wales Station.—The L.M.S.R. announces that on and from Monday, July 5, Griffith's Crossing station, on the Bangor and Caernarvon Section, will be closed for all traffic other than freight traffic in full loads, which will continue to be dealt with at the station freight siding. Parcels and miscellaneous traffic, including small goods traffic, will be dealt with at Caernarvon; passengers will be able to use Port Dinorwic, or Caernarvon stations, each two miles distant from Griffiths Crossing, and from each of which there is a frequent bus service.

British and Irish Traffic Returns

GREAT BRITAIN	Totals for 24th Week			Totals to Date		
	1937	1936	Inc. or Dec.	1937	1936	Inc. or Dec.
L.M.S.R. (6,874 mls.)	£	£	£	£	£	£
Passenger-train traffic	544,000	530,000	+ 14,000	10,852,000	10,407,000	+ 445,000
Merchandise, &c.	513,000	493,000	+ 20,000	11,723,000	11,415,000	+ 308,000
Coal and coke	225,000	220,000	+ 5,000	6,439,000	5,981,000	+ 458,000
Goods-train traffic	738,000	713,000	+ 25,000	18,162,000	17,396,000	+ 766,000
Total receipts	1,282,000	1,243,000	+ 39,000	29,014,000	27,803,000	+ 1,211,000
L.N.E.R. (6,315 mls.)						
Passenger-train traffic	369,000	344,000	+ 25,000	7,109,000	6,795,000	+ 314,000
Merchandise, &c.	359,000	325,000	+ 34,000	8,126,000	7,775,000	+ 351,000
Coal and coke	233,000	216,000	+ 17,000	6,082,000	5,710,000	+ 372,000
Goods-train traffic	592,000	541,000	+ 51,000	14,208,000	13,485,000	+ 723,000
Total receipts	961,000	885,000	+ 76,000	21,317,000	20,280,000	+ 1,037,000
G.W.R. (3,738½ mls.)						
Passenger-train traffic	236,000	219,000	+ 17,000	4,533,000	4,358,000	+ 175,000
Merchandise, &c.	208,000	196,000	+ 12,000	4,718,000	4,542,000	+ 176,000
Coal and coke	109,000	94,000	+ 15,000	2,707,000	2,444,000	+ 263,000
Goods-train traffic	317,000	290,000	+ 27,000	7,425,000	6,986,000	+ 439,000
Total receipts	553,000	509,000	+ 44,000	11,958,000	11,344,000	+ 614,000
S.R. (2,153 mls.)						
Passenger-train traffic	364,000	355,000	+ 9,000	7,007,000	6,614,000	+ 393,000
Merchandise, &c.	68,500	66,500	+ 2,000	1,439,000	1,495,500	− 56,500
Coal and coke	27,500	27,500	—	754,000	759,500	− 5,500
Goods-train traffic	96,000	94,000	+ 2,000	2,193,000	2,255,000	− 62,000
Total receipts	460,000	449,000	+ 11,000	9,200,000	8,869,000	+ 331,000
Liverpool Overhead (6½ mls.)	1,341	1,348	− 7	29,256	27,294	+ 1,962
Mersey (4½ mls.)	3,834	3,660	+ 174	100,678	96,893	+ 3,785
*London Passenger Transport Board	556,900	568,000	− 11,100	28,158,200	27,900,000	+ 258,200
IRELAND.						
†Belfast & C.D. pass. (80 mls.)	2,895	3,149	− 254	48,810	49,911	− 1,101
,, ,, goods	509	557	− 48	12,050	13,577	− 1,527
,, ,, total	3,404	3,706	− 302	60,860	63,488	− 2,628
Great Northern pass. (543 mls.)	11,200	11,150	+ 50	213,300	212,250	+ 1,050
,, ,, goods	8,900	8,550	+ 350	226,450	242,500	− 16,050
,, ,, total	20,100	19,700	+ 400	439,750	454,750	− 15,000
Great Southern pass. (2,075 mls.)	37,708	36,564	+ 1,144	723,351	730,642	− 7,291
,, ,, goods	39,199	38,163	+ 1,036	992,440	1,008,477	− 16,037
,, ,, total	76,907	74,727	+ 2,180	1,715,791	1,739,119	− 23,328

* 51st week (before pooling) † 25th week

British and Irish Railway Stocks and Shares

Stocks	Highest 1936	Lowest 1936	Prices June 23, 1937	Rise/Fall
G.W.R.				
Cons. Ord.	64¼	45½	61¼	+½
5% Con. Prefce.	126½	116¾	118½	—
5% Red. Pref. (1950)	113	108½	111½	—
4% Deb.	119½	110½	106½*	−2
4½% Deb.	121	114	111½*	−1½
4½% Deb.	129	121	117½*	−2
5% Deb.	141	134	128½*	−2
2½% Deb.	79⅛	74	69½*	−1
5% Rt. Charge	136½	130	127½*	−2
5% Cons. Guar.	135¼	127¾	127	—
L.M.S.R.				
Ord.	35⅝	17	33	−¼
4% Prefce. (1923)	83	52½	76½	—
4% Prefce.	92¾	81	86	−½
5% Red. Pref. (1955)	109¼	103¼	104	—
4% Deb.	111¾	105⅝	103	—
5% Red. Deb. (1952)	119⅝	115½	112½	—
4% Guar.	106¾	101⅝	99½	−½
L.N.E.R.				
5% Pref. Ord.	14	9	10	—
Def. Ord.	7¼	4¾	5	—
4% First Prefce.	79¼	55¼	70	—
4% Second Prefce.	31⅞	18¼	25	—
5% Red. Pref. (1955)	100½	77¾	96	—
4% First Guar.	104½	98¾	99	−½
4% Second Guar.	99	90	92	—
3% Deb.	85¾	79	78	−½
4% Deb.	109¾	104½	102	−½
5% Red. Deb. (1947)	116¼	110½	109½	—
4½% Sinking Fund Red. Deb.	111½	107½	107	—
SOUTHERN				
Pref. Ord.	98¾	82½	92	—
Def. Ord.	27⅝	20⅛	22	−½
5% Pref.	120¾	118½	116½	−1
5% Red. Pref. (1964)	119¾	115¼	115½	—
5% Guar. Prefce.	136	129½	127	—
5% Red. Guar. Pref. (1957)	120	115¾	115½	—
4% Deb.	117 5/16	109½	105	—
5% Deb.	140	134	126½	—
4% Red. Deb. 1962–67	116½	110	108½	—
BELFAST & C.D.				
Ord.	9	4½	4	—
FORTH BRIDGE				
4% Deb.	107	105	100½*	−2
4% Guar.	107 5/16	104	100½*	−2
G. NORTHERN (IRELAND)				
Ord.	19½	9¾	7¾	−¼
G. SOUTHERN (IRELAND)				
Ord.	63	41	34½	−7½
Prefce.	65	46	48½	—
Guar.	97¼	81	72	−11½
Deb.	99¾	83¼	89	—
L.P.T.B.				
4½% "A"	127¾	121	116½	—
5% "A"	138¼	133½	126½	—
4½% "T.F.A."	111½	108⅛	106	—
5% "B"	131¾	123¾	117½	—
"C"	112½	93	81	−1
MERSEY				
Ord.	40¾	23	27½	−1
4% Perp. Deb.	103	98	99	—
3% Perp. Deb.	78	74⅝	75½	—
3% Perp. Prefce.	68⅞	63¼	65½	+1

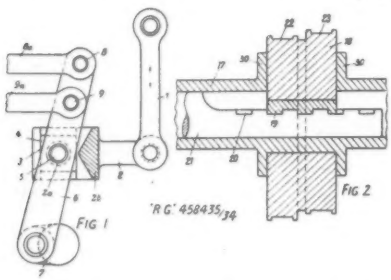
* ex dividend

ABSTRACTS OF RECENT PATENTS*

No. 458,435. Reversing Gear

Hugo Lentz, of 74, Kurfürstendam, Berlin-Halensee (Convention date, December 19, 1934).

In order to ensure that the exhaust valves of a steam engine poppet valve gear are held open for a longer period as larger quantities of steam are supplied, a special reversing gear has been devised which delays the compression period so that the larger quantity of steam can reliably flow out of the cylinder during the exhaust period. This is effected by changing



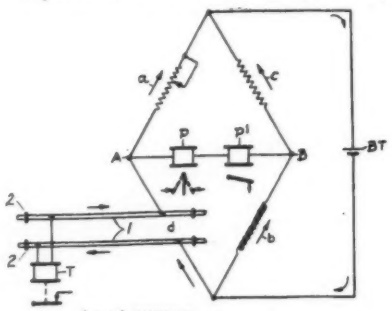
the angles of advance for the admission valve and the exhaust valve so that the exhaust valve is held open longer as the quantity of steam increases. One form of reversing gear is illustrated in Fig. 1, where a link motion is utilised. A tie rod 1, adjustable from the driver's stand, acts on an arm 2 mounted on a prism 2*b* to oscillate it around a pin 2*a* fixed in the machine frame. This prism 2*b* has an open slot with guides 3 for sliding blocks 4 on either side, which are interconnected by a pin 5 forming the pivot axle for a rocker lever 6. The lower end of this lever is hingedly connected with a crank 7 which imparts a rocking movement to it, while the upper end of the lever 6 is pivotally connected at 8 to a link 8*a* operating the admission valves. The upper end of lever 6 is also pivotally connected at 9 to a link 9*a* operating the exhaust valves. Owing to the different distances of the pins 8 and 9 from the pivot axle 5, in the case of common drive of the admission and exhaust valves, the exhaust valves open for a longer time with larger quantities of steam, thereby ensuring that the compression begins later. Instead of using links, adjustable eccentrics may be used, both driven from a hollow shaft 17, Fig. 2.

An adjusting member 18 is mounted in a transverse slot in the hollow shaft 17, this slot being limited by two ring flanges 30 on a prismatic part 31 connecting the two ring flanges, the adjusting member having a longitudinal slot 32. On the one side of slot 32 a plate 19 having teeth is inserted, the teeth of which mesh with teeth 20 on an adjusting rod 21 axially shiftable in the hollow shaft 17. When this rod is shifted, it shifts the adjusting member 18 in the direction of the transverse slot 32. The adjusting member 18 has two mutually displaced eccentric races 22 and 23, from which by eccentric rods the oscillatable levers 10*a* and 11*a* of the long shafts 10 and 11 are operated. The eccentric 22 serves for operating the admission valves and the other eccentric 23 for operating the exhaust valves. The throw of the exhaust eccentric is smaller when it is in its medial position than that of the admission eccentric.—(*Accepted December 21, 1936.*)

No. 458,356. Railway Track Electric Circuits

General Railway Signal Company, of Rochester, New York, U.S.A. (Convention date, July 28, 1934).

In a railway signalling system where a train upon entering a section creates a short circuit between the two track rails 1, and thus shunts a track relay *T* controlling the operation of a semaphore signal, there is a danger that the resistance of the ballast between the rails will sink to a value sufficiently low to permit enough of the current normally passing through the rails, to leak from one rail to another, and to interfere with the proper functioning of the track relay. To overcome this danger, the present invention proposes to use a battery *BT* individual to each section, to which it is connected through a Wheatstone bridge. Each section is insulated from adjacent sections by insulators 2 and forms the unknown resistance in one arm of the bridge, whilst a variable resistance *a* for balancing the unknown resistance is disposed in another arm and variably

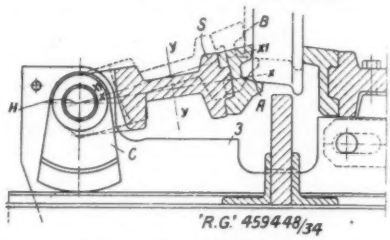


controlled by a reversible electric motor (not shown) which is itself controlled by the two relays *P*, *P*¹ in the diagonal *A*, *B* of the bridge. Consequently, any gradual change in the resistance between the two track rails, such as that due to variation in ballast resistance, will be compensated for by resistance *a* automatically, and the operation of the track relay will not be affected, but a sudden change in resistance such as that caused by a train entering the section, will shunt the track relay *T* and cause the semaphore signal to be operated.—(*Accepted December 17, 1936.*)

No. 459,448. Automatic Track Brakes

Rail Brakes Limited, 515, Australia House, Strand, London, W.C.2 (August 31, 1934).

A further solution is suggested by this invention of the problem of making allowance for wheel tolerance in order that the brake shoe of an automatic weight-operated track brake may engage all the wheels of a vehicle on one side irrespective of varying thick-



ness of the wheels. In accordance with the present invention the cross section of a swinging brake shoe beam is so shaped and disposed that the axis of its smallest moment of inertia is normal to the path of movement. This moment of inertia is sufficiently small to allow deflection of the beam to an extent sufficient to apply braking forces simultaneously to wheels of varying thickness. Thus, in Fig. 1 the full lines indicate the position of beam *s* and treadle *A* when a thin wheel is braked, whilst the broken lines show the position of the same parts for a thick wheel. If the axis *x-x* of smallest moment of inertia passes through the axis of the shaft *H* about which the beam swings, then upon a thick and a thin wheel both being into the section at the same time, the beam will bend along an axis *y-y* perpendicular to *x-x*, and effect braking of both wheels. —(*Accepted January 4, 1937.*)

No. 459,144. Air-Conditioning Apparatus

J. Stone & Co. Ltd., of Deptford, Kent, and A. H. Chilton, of 200, Brompton Road, London, S.W.3 (July 1, 1935).

Where a railway carriage has smoking and non-smoking compartments it is difficult, if only a single air-conditioning unit is used, to prevent the reconditioned air from having some smell of tobacco-smoke, and this may be objectionable to occupants of the non-smoking compartments. The present invention overcomes this difficulty by providing separate air circuits and air-conditioning or cooling units for the two sections, which units are served by a single refrigerator-compressor having its speed controlled in a manner such that it is lowered when the loading in one of the compartments

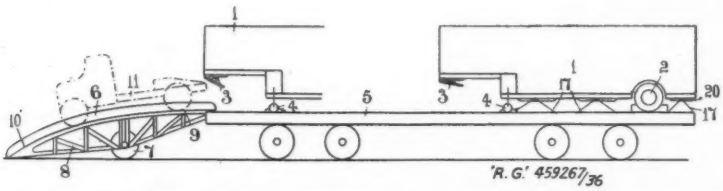
* These abridgments of recently published specifications are specially compiled for THE RAILWAY GAZETTE by permission of the Controller of His Majesty's Stationery Office. Group abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, either sheet by sheet as issued on payment of a subscription of 5s. a group volume, or in bound volumes, price 2s. each, and the full specifications can be obtained from the same address price 1s. each.

is reduced. Thus, the compressor may always be run at an economical speed even though one of the compartments may be full whilst the other is empty. The speed of the driving motor may be regulated either by inserting a resistance in the armature circuit, or by varying the field excitation. This regulation is effected by means of thermostatic switches disposed in the compartments.—(*Accepted January* 1, 1937.)

No. 459,267. Mixed Road and Rail Vehicles

Truck and Tractor Appliance Co. (Manchester) Ltd., of Richmond Road, Trafford Park, Lancashire (June 13, 1936).

A trailer 1 is provided with a number of rods 20 through which ropes 17 may be passed for securing the trailer to a railway truck platform 5. Auxiliary wheels 4 are also provided on the trailer for supporting it when not attached to a tractor by means of coupling 3. A portable ramp 6 is also suggested having a convex curved runway 10 supported on a lattice girder chassis mounted on wheels 7. The portion 9 of the ramp is horizontal whilst the other end is resting on the ground.—(*Accepted January* 5, 1937.)



COMPLETE SPECIFICATIONS ACCEPTED

457,907. Whyman, F., and Metropolitan-Vickers Electrical Co. Ltd. Electrically driven locomotives and trains.

457,991. Sperat, F. Methods of setting up assembled pairs of locomotive wheels for centre-marking and machining.

458,121. Aktieselskapet Fredriksstad Mek. Verksted. Apparatus for drawing off steam from multi-stage expansion steam engines.

458,356. General Railway Signal Co. Ltd. Railway track circuits.

458,435. Lentz, H. Reversing-gear for steam engines with poppet-valve gear, especially for locomotive and marine steam engines.

458,190. Manufacture Generale Metallurgique Soc. Anon. Heating devices particularly for railway carriages.

458,277. Dyson, J., and Marenbon, A. Road vehicles for the combined road and rail transport of material.

458,278. Standard Telephones & Cables Limited, and Brown, A. Railway or like signalling systems.

458,279. Standard Telephones & Cables Limited, and Griffiths, J. B. Railway or like signalling systems.

458,285. Standard Telephones & Cables Limited, and Brown, A. Wheel-actuated treadles for railway signalling systems.

458,209. Ateliers Vaucanson. Systems of recording and repeating signals of the track on locomotives and automative rail vehicles.

458,657. Felten & Guilleaume Carls-Werke A.G. Electric contact devices operated by rail deflection on the passage of a train.

459,133. Greenly, K. H., and Greenly, H. System of automatic train control for railways and the like.

459,144. Stone & Co. Ltd., J., and Chilton, A. H. Air-conditioning apparatus particularly for use on railway vehicles.

459,448. Rail Brakes Limited. Track brakes for railways and the like.

459,267. Truck & Tractor Appliance Co. (Manchester) Ltd. (Kutsukian, F.). Loading road vehicles on to railway trucks.

Staff and Labour Matters

Holidays with Pay

The Government Committee of Enquiry on the question of holidays with pay met in London on June 17 under the Chairmanship of Lord Amulree and heard evidence tendered on behalf of the Entertainments Protection Association and by representatives of the co-operative movement. Mr. A. V. Alexander, M.P., Secretary of the Parliamentary Committee of the Co-Operative Congress said he "estimated the cost to the movement, of giving holidays with pay, at between £600,000 and £700,000 per annum.

The New L.P.T.B. Busmen's Agreement

The London Passenger Transport Board and the Transport and General Workers' Union, by the new Agreement reached last week (see page 1182 of our issue of June 18), appear to have reached a mutually satisfactory conclusion to the troubles which occurred during last month. The Agreement replaces that which was terminated when the Central London area men went on strike on May 1. New rates of pay have been determined differentiating between drivers and conductors engaged before June 15 and men engaged after that date. The "no accident" bonus is to be merged into the standard rate of pay, and this new consolidated rate is to become the basis for calculating overtime, &c. The normal working week is to consist of six scheduled duties, each carrying not less than eight hours pay at the standard rate. A minimum meal relief of thirty minutes is to be scheduled in all duties with a spreadover in excess of six hours and meal reliefs in excess of 45 minutes are to be counted as time worked. Special provisions are laid down in respect of duties performed on Sundays and public holidays.

The general result is that the board has made substantial concessions to the men, and the union recognising this, has ratified the terms of the Agreement and recommended them for general acceptance. The Agreement is a lengthy but businesslike document. Disputes as to its interpretation are to be referred to a board of referees consisting of representatives of each side, together with an independent chairman.

Meeting of Railway Staff National Council

The Railway Staff National Council met in London yesterday (Thursday) to consider the important wage claims submitted by the three Railway trade unions. At the time of writing these notes no report of the proceedings had been issued.

Road Transport Wages

The Minister of Labour and the Parliamentary Secretary to the Ministry of Transport, received last week a deputation from the National Joint Conciliation Board for the Road Motor Transport Industry (Goods). The deputation, which made representations regarding the Baillie Committee Report, which was summarised in our issues of May 7 and May 28, was assured that the report was being "actively considered."

New French Railway and Tourist Office in London

M. Corbin, the French Ambassador, in the presence of a distinguished gathering, which included Dr. Burgin, Minister of Transport, M. Roussellier, Chairman of the French National Tourist Centre in Paris, M. Réné Mayer, Vice-President of the Northern Railway of France, M. Le Besnerais, General Manager of the Northern Railway of France, Mr. W. Bishop, Solicitor, and Mr. G. S. Szlumper, Assistant General Manager of the Southern Railway, and many other French and English personalities, last Monday opened the new offices of the French railways and national tourist organisation at 179, Piccadilly, London, W.1.

Speaking in French, M. Corbin referred to the advantages which would result from the French railways and tourist organisations being united in premises so central and convenient. Here travellers would be able to obtain all the information they required regarding travel in France and, especially this year, the Paris Exhibition. Dr. Burgin, who also spoke in French, referred to the first French railway office which was opened in London as long ago as 1851 by the Nord. In 1907 the P.L.M. opened its office at the same address as that on which the new office stood, the most central position which could be obtained.

Count J. de Kerdrel, whose office is at Victoria station, is General Manager of the new combined organisation, and M. Roland Marcel is in charge on the spot.

CONTRACTS AND TENDERS

Locomotives for China and Africa

The North British Locomotive Co. Ltd. has received an order from the Chinese Government Purchasing Commission through Matheson & Co. Ltd., to the inspection of Messrs. Sandbergs, for six 0-8-0 type standard-gauge tender locomotives required for the King-Kan Railway.

The Vulcan Foundry Co. Ltd. has received an order from the Crown Agents for the Colonies for five 3-ft. 6-in. gauge 4-8-2 type goods locomotives and tenders required for the Gold Coast Government Railway.

The High Commissioner for New Zealand has placed orders on behalf of the New Zealand Government Railways for flax canvas for tarpaulins as follows :—Baxter Brothers, 160,000 yards, approximate value £19,120, and Boase Spinning Co. Ltd., 80,000 yards, approximate value £9,500.

The L.M.S.R. has placed orders, each for 20,000 grain sacks, with Jute Industries Limited and A. & S. Henry Limited. When these orders have been completed, the L.M.S.R. stock of these sacks available for hire to millers, merchants and farmers will be approximately 657,000.

Matheson & Co. Ltd. has placed the following orders under the King-Kan Railway Loan Agreement for equipment to be supplied to the inspection of Messrs. Fox & Mayo :—

Henry Broadbent Limited, Two 14-in. lathes.
Churchill Redman Limited, Two 9-in. lathes.
Abtus Limited, 30 hand trolleys and four motor trolleys.

The Madras & Southern Mahratta Railway Administration has placed orders, to the inspection of Messrs. Rendel, Palmer & Tritton, with Thomas Firth & John Brown Limited for 55 steel straight axles for locomotives, and with Kitson & Co. Ltd. for duplicate parts for locomotives.

The Westinghouse Brake & Signal Co. Ltd. has received an order from the Assam-Bengal Railway Administration, to the inspection of Messrs. Rendel, Palmer & Tritton, for 44 Neale's tablet instruments.

Heatley & Gresham Limited has received orders from the Controller of Stores, North Western Railway of India, for one superheated boiler for XA, XA1 class locomotives, and one superheated boiler for XC class locomotive.

The Bombay, Baroda & Central India Railway Administration has placed the following orders, to the inspection of Messrs. Rendel, Palmer & Tritton :—

Skoda Works, through Carters Merchants Limited, 550 carriage and wagon tyres and 1,164 locomotive tyres.
John Baker & Bessemer Limited, 450 carriage and wagon axles.
Fried. Krupp A.G., 521 locomotive axles and 350 volute springs.

The Vulcan Foundry Co. Ltd. has received orders from the Government of India, Railway Department (Railway Board) for a total of ten WM class broad-gauge locomotives to be divided equally between the East Indian and Great Indian Peninsula Railways and supplied at Rs. 1,33,920 each f.o.r. Calcutta or Bombay respectively.

L.N.E.R. Rail Orders

The L.N.E.R. has placed orders for a total of 60,000 tons of steel rails divided as follows :—

Dorman Long & Co. Ltd., Cargo Fleet Iron Co. Ltd., and Skinningrove Iron Co. Ltd., 30,724 tons, divided.
Consett Iron Co. Ltd., 6,526 tons.
Lancashire Steel Corporation, 5,250 tons.
Colvilles Limited; 5,000 tons.
Steel Company of Scotland, 4,500 tons.
S. Fox & Co. Ltd., 4,000 tons.
Shelton Iron, Steel & Coal Co. Ltd., 2,000 tons.
Barrow Hematite Steel Co. Ltd., 1,000 tons.
United Steel Co. Ltd., Workington Branch, 1,000 tons.

The Chinese Government Purchasing Commision has also placed orders for equipment required for the Canton-Hankow Railway as follow :—

Henry Broadbent Limited, two 8½-in. high-speed sliding, surfacing and screw cutting gap bed lathes.
Herbert Morris Limited, two electric overhead travelling cranes.

The Chinese Government Purchasing Commission has placed the following orders, to the inspection of Messrs. Fox & Mayo :—

Ferguson & Palin Limited, Electric control equipment, including transformers and oil circuit breakers.
Metropolitan-Vickers Electrical Co. Ltd., Three 2,500 kVA. transformers.
Henry Berry & Co. Ltd., One spring-testing and scragging machine.

The Chinese Government Purchasing Commission has placed the following orders through Matheson & Co. Ltd., to the inspection of Messrs. Fox & Mayo, for the King-Kan Railway :—

Glenfield & Kennedy Limited, 14 locomotive water cranes.
W. & T. Avery Limited, 30 platform weighing machines, 15 counter balances and two 80-ton capacity railway weighbridges.

Further to the announcement in this column in our issue of June 18 regarding orders for diesel railcars placed with the Drewry Car Co. Ltd. by the Buenos Ayres Great Southern and Buenos Ayres Western Railways, we are now able to add that each of these railcars is to be fitted with a 93/102-h.p. Gardner compression-ignition engine, Vulcan-Sinclair hydraulic coupling and Wilson-Drewry pre-selective epicyclic transmission, with pneumatic control duplicated on each side of the cab.

The Drewry Car Co. Ltd. has also received orders for light internal combustion-engined locomotives from the Union Cold Storage Co. Ltd., the National Smelting Co. Ltd., the British Thomson-Houston Co. Ltd. amongst others, whilst recent orders for railcars include two light six-seater cars for the F.M.S. Railways, and a light trolley and eight-seater inspection car for the Anglo-Iranian Oil Co. Ltd.

W. G. Bagnall Limited has received an order from the Jodhpur Railway Administration, to the inspection of Messrs. Rendel, Palmer & Tritton, for one PM class locomotive boiler.

John I. Thornycroft & Co. Ltd. has received a further repeat order from the San Paulo Railway for six 12½-ton rigid six-wheeled vehicles with locally built bodywork. These chassis, with a wheelbase of 18 ft. mean, incorporate forward control, thereby providing a maximum body space of 22 ft. 6 in. The chassis will be fitted with Thornycroft 11·3 litre six-cylinder oil engines having a bore and stroke of 121 mm. × 165 mm. The San Paulo Railway already operates a fleet of nearly 70 Thornycroft freight and passenger vehicles and all the most recent purchases have been for oil-engined large capacity goods vehicles.

John I. Thornycroft & Co. Ltd. has also in hand an order from the Rhodesia Railways, placed through Fraser & Chalmers (S.A.) Limited, for oil-engined 7-ton chassis.

Kitson & Co. Ltd., have received an order from the Leopoldina Railway for six locomotive boilers.

The Crown Agents for the Colonies have recently placed the following orders :—

Phosphor Bronze Co. Ltd., Axlebox and connecting rod brasses.
British Insulated Cables Limited, Cable.
Hackbridge Cable Co. Ltd., Cable.
Steel, Peech & Tozer, Locomotive carriage and wagon tyres.
Sir Wm. Arrol & Co. Ltd., Steel and ironwork for bridges.
Birmingham Battery & Metal Co. Ltd., Copper.
Eyre Smelting Co. Ltd., Copper ingots.
Whitecross Co. Ltd., Copper wire.
Spencer Wire Co. Ltd., Copper wire.
Ruston & Hornsby Limited, Diesel engine generating set.
General Electric Co. Ltd., Electric bulbs and telephone exchange equipment.
Vacuum Oil Co. Ltd., Engine oil.
Wolverhampton Corrugated Iron Co. Ltd., Galvanised corrugated steel sheets.
Jones, Burton & Co. Ltd., Lathe.
Howell & Co. Ltd., Steel tubes.
Tubes Limited, Steel tubes.
Steel Co. of Scotland Limited, Locomotive tyres.
Electric Construction Co. Ltd., Motor alternator and motor generator set.
John I. Thornycroft & Co. Ltd., Motor omnibuses.
P. & W. MacLellan Limited, Mild steel plates and steel joists.
Stuart Turner Limited, Petrol engine generator sets.
Phosphor Bronze Co. Ltd., Phosphor-bronze metal.
Wm. Baird & Co. Ltd., Pig iron.
Metropolitan-Vickers Electrical Co. Ltd., Power station switchgear.
Horseley Bridge & Thomas Piggott Limited, Pressed steel tank, and steel framed buildings for power stations.
Pulsometer Engineering Co. Ltd., Pumping plant.
Cargo Fleet Iron Co. Ltd., Rails and fishplates.
United Steel Cos. Ltd., Rails and fishplates and steel sleepers.
C. Leary & Co., Rail sleepers and crossing timbers.
Dorman, Long & Co. Ltd., Round steel joists.
Guest, Keen & Nettlefolds Limited, Steel sleeper keys.

OFFICIAL NOTICES

RAILWAY AND OTHER REPORTS

Snowdon Mountain Railway.—The net profit for 1936 was £3,854 (against £3,734 for 1935) and £6,096 was brought forward. The directors again recommend a dividend of 5 per cent., leaving £6,450 to be carried forward. They also recommend that £500 be set aside as a reserve fund for renewal of locomotives.

Benguela Railway.—The report for 1936 of this company, which is controlled by Tanganyika Concessions Limited, shows that the receipts in Africa were 28,030,173 escudos, an increase of 3,598,147 escudos in comparison with 1935. Working expenses (19,480,583 escudos) were lower by 1,544,988 escudos, and net earnings rose from 3,406,455 to 8,549,589 escudos. The London Committee profit and loss account shows an excess of receipts over expenditure, before provision for renewals, of 5,886,308 escudos, which has been set aside for debenture interest.

Dorada Railway.—Gross revenue of the railway for the year 1936 was £173,935, an improvement of £29,228, and the working expenses of £98,937 showed an increase of £6,605, or 7·15 per cent., so that in the net receipts of £74,998 there was an advance of £22,623. The dividend is at the rate of 4½ per cent. for the year, comparing with 3 per cent. for 1935. The number of passengers carried was 168,946, or 17,879 more than in 1935, and the revenue therefrom was £1,530 more. Paying goods traffic was greater than in 1935 by 38,746 tons, or 22·70 per cent., and the receipts therefrom were £31,100, or 27·2 per cent., better. The increase in working expenses was accounted for by the heavier traffic, by the social legislation recently introduced by the Colombian Government, and by some exceptional expenditure on stations and buildings.

Chloride Electrical Storage Co. Ltd.—For the year ended March 31, the profit was £432,442, and there was a net profit, after depreciation, income tax, etc., of £364,817. A final dividend of 5 per cent. and a bonus of 5 per cent. on the A and B ordinary shares are again recommended, making a total distribution of 15 per cent. for the year. A sum of £150,000 (against £125,000) is appropriated to general reserve, the employees' pension and benefit fund receives £12,000, and a further provision of £25,000 is made towards the establishment of a pensions fund for the employees of subsidiaries. The balance forward is raised from £72,020 to £84,580. During the year further businesses were acquired and in various ways the scope of the company's operations was enlarged.

Ruston & Hornsby Limited.—The directors report a net profit for the year ended March 31 of £140,906, compared with £109,829 for the previous 12 months. A dividend of 6¼ per cent. is to be paid on the ordinary stock (against 5 per cent.) and a transfer is to be made to general reserve of £50,000 (against £25,000), leaving £50,124 to be carried forward (against £59,593).

Butterley Co. Ltd.—The directors recommend a final dividend of 6 per cent., free of tax, making, with the 2 per cent., tax free, interim, a total of 8 per cent. net for the year to March 31 last. This is equal to £10 12s. 5d. per cent., subject to tax. The dividend is payable June 30. For the previous year the final distribution was 5 per cent., tax free, making 6½ per cent., tax free, or £8 9s. 10d. per cent. gross, for the 12 months on the £1,800,000 of issued ordinary capital.

Devon General Omnibus & Touring Co. Ltd.—This company is jointly controlled by the British Electric Traction Co. Ltd., through its subsidiary, the National Electric Construction Co. Ltd. (50 per cent.), the Great Western Railway Company (30 per cent.), and the Southern Railway Company (20 per cent.). The profit for the year 1936, after providing for depreciation, was £74,320, against £72,022 for 1935. Adding £11,898 balance from the previous year makes a total of £86,218, against £77,398. The directors recommend that £35,000 (against £30,000) be appropriated to reserve, a dividend on preference shares for the year (£10,500), a dividend of 10 per cent. and a bonus of 2½ per cent. on the ordinary shares (£25,000), leaving £15,718 to be carried forward. The dividend and bonus distributions are the same as for 1935.

Eastern Counties Omnibus Co. Ltd.—The accounts of this Company, which is controlled jointly by L.N.E.R. and L.M.S.R. companies and by Tilling & British Automobile Traction Limited, for the year ended March 31, 1937, show a profit of £66,027 (against £58,063), to which must be added £26,952 brought forward, making a total of £92,979. The preference dividend takes £10,000, and the directors recommend a dividend of 8 per cent. for the year, which will absorb £53,765 and leave £29,214 to be carried forward. For the previous year the dividend was 7 per cent., requiring £47,045. Several small omnibus businesses have been acquired during the year. A site has been obtained for an omnibus station and garage at Great Yarmouth, and alterations are in progress at the company's premises at Lowestoft for the provision of a similar station. A company has been formed, in which the Eastern Counties Company holds all the shares, to carry on the coach building business at Lowestoft.

Thames Valley Traction Co. Ltd.—Jointly controlled by Tilling & British Automobile Traction Limited and by the Great Western and the Southern Railway Companies, this company secured in 1936 a profit after providing for depreciation and for directors' fees, of £11,274, which, added to £6,634 brought in, gives a total of £17,908. The directors recommend a dividend of 7½ per cent. (the same) on the share capital, and this will absorb £11,250, leaving £6,658 to be carried forward. The revenue of the company was adversely affected by a strike of employees from June 14 to July 1 inclusive.

Western Welsh Omnibus Co. Ltd.—This company, which is in association with the Great Western Railway Company, obtained for the year ended March 31, 1937, a net profit, after providing for depreciation, of £61,874 (against £45,173 for the previous year), out of which the directors propose to appropriate £4,000 (against £3,000) to employees' assistance fund, £34,800 to a dividend of 10 per cent. on 348,000 shares, £3,480 to a dividend of 6 per cent. on 58,000 additional shares issued during the year, and £19,594 to undivided profits account, making that account £34,744. The following additional businesses have been acquired during the year: B. Langley, Abersychan; the Cardiff-Aberystwyth Service of Gough's Welsh Motorways; Phipps Motors Limited. Subsidiary companies now in voluntary liquidation are: Thomas White & Co. (Cardiff & Barry) Limited; C. J. Vincent (Cardiff) Limited. Offices and waiting rooms have been opened at Carmarthen and Ammanford and additional freehold land has been acquired at Cardiff and Bridgend for future extensions.

Railway Share Market

Owing to the reactionary and inactive conditions in the stock and share markets, which tended to be intensified by the European political situation, Home railway stocks have been lifeless and moved to lower prices. The latter brought in buyers, particularly in view of the further good traffic figures, but the demand was not sufficient to influence prices to any extent.

The L.N.E.R. traffics were again particularly encouraging and the second preference was firmer around 24¾, but the first preference, which offers a favourable yield, was neglected and is lower at 69¾. On the basis of the traffics in the current year to-date, the market had been doubtful if hopes of a larger payment on the second preference were justified. Nevertheless, if receipts continue around the level shown for the past two weeks there would be little doubt of an increased dividend. L.M.S.R. ordinary was active, but best prices were not maintained, the increase in the traffics for the past week having been below market expectations. The 1923 preference and 4 per cent. preference stocks failed to move in favour of holders. So far this year the railway's receipts have shown a higher rate of expansion than those of the other main line railways, and on present indications its ordinary stock has the best prospects of an increased distribution, but the forthcoming half-yearly statements have to be awaited for information as to the upward movement in expenses.

Great Western ordinary was out of favour, despite the further good traffics, and business took place around the lower level of 61⅛. Although not generally expected, if, as suggested in some quarters, the half-yearly dividend on this stock were raised from ¼ per cent. to ½ per cent., the price would no doubt respond readily, as this would be taken as indicating favourable possibilities of an increase in the total dividend above last year's 3 per cent. Southern preferred and deferred were lower, business being around 92 and 22 respectively. London Transport "C" failed to develop a better tendency.

Argentine railway stocks were inclined to improve earlier in the week, but have since made lower prices, sentiment being influenced by general market conditions. Despite the favourable potential yields, if expectations in regard to dividends are realised this year, Central Argentine, B.A. Great Southern and B.A. Western preference stocks were lower. Cordoba Central debentures were better on the view that the proposed purchase of the line by the Argentine Government will go through later in the year. Elsewhere, San Paulo and other Brazilian railway stocks were fairly steady. Rather more attention was given to United of Havana issues.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

	Railways	Miles open 1936-37	Week Ending	Traffics for Week: Total this year	Traffics for Week: Inc. or Dec. compared with 1936	No. of Weeks	Aggregate Traffics to Date: Totals: This Year	Aggregate Traffics to Date: Totals: Last Year	Aggregate Traffics to Date: Increase or Decrease	Shares or Stock	Prices: Highest 1936	Prices: Lowest 1936	Prices: June 23, 1937	Yield (See Note)
				£	£		£	£	£					
South & Central America.	Antofagasta (Chili) & Bolivia	834	20.6.37	17,020	+ 2,640	25	413,630	335,970	+ 77,660	Ord. Stk.	25	15¼	18	Nil
	Argentine North Eastern ..	753	19.6.37	12,221	+ 6,572	51	454,744	405,907	+ 48,837	,,	12	2	10½	Nil
	Argentine Transandine ..	—	—	—	—	—	—	—	—	A. Deb.	54	45	85	4 11/16
	Bolivar	174	May, 1937	6,100	— 1,800	22	29,300	34,800	— 5,500	6 p.c. Deb.	9	5	8½	Nil
	Brazil	—	—	—	—	—	—	—	—	Bonds.	16	11½	15½	3¼
	Buenos Ayres & Pacific ..	2,806	19.6.37	96,340	+ 28,871	51	4,917,475	4,313,396	+ 604,079	Ord. Stk.	17½	6	10½	Nil
	Buenos Ayres Central ..	190	12.6.37	$167,400	+ $71,860	50	$7,077,900	$5,342,200	+ $1,735,700	Mt. Deb.	31½	11	30½	Nil
	Buenos Ayres Gt. Southern	5,084	19.6.37	116,377	+ 8,156	51	7,543,877	6,561,432	+ 982,445	Ord. Stk.	31⅝	13⅜	25	Nil
	Buenos Ayres Western ..	1,930	19.6.37	42,990	+ 6,584	51	2,540,277	2,302,472	+ 237,805	,,	29⅝	11	21½	Nil
	Central Argentine	3,700	19.6.37	156,486	+ 38,154	51	7,830,083	5,977,162	+ 1,852,921	,,	32 32	8¾	25	Nil
	Do.	—	—	—	—	—	—	—	—	Dfd.	21	4½	11½	Nil
	Cent. Uruguay of M. Video	273	12.6.37	12,811	+ 2,057	50	626,728	557,820	+ 68,908	Ord. Stk.	7¾	3	5	Nil
	Do. Eastern Extn.	311	12.6.37	3,525	+ 1,639	50	129,619	104,557	+ 25,062	—	—	—	—	—
	Do. Northern Extn.	185	12.6.37	2,403	+ 657	50	91,656	74,425	+ 17,231	—	—	—	—	—
	Do. Western Extn.	211	12.6.37	699	— 17	50	47,852	43,508	+ 4,344	—	—	—	—	—
	Cordoba Central	1,218	19.6.37	$3,370	+ 250	51	1,637,270	1,427,330	+ 209,940	Ord. Inc.	5	1	4½	Nil
	Costa Rica	188	Apr., 1937	20,677	+ 5,633	43	192,328	142,473	+ 49,855	Stk.	36½	32	36	5 9/16
	Dorado	70	May, 1937	14,000	+ 400	22	76,400	65,700	+ 10,700	1 Mt. Db.	107	101½	104 2§	5¾
	Entre Rios	810	19.6.37	14,782	+ 4,759	51	658,515	547,360	+ 111,185	Ord. Stk.	17	6	12	Nil
	Great Western of Brazil ..	1,082	19.6.37	6,700	+ 700	25	185,200	200,800	— 15,600	Ord. Sh.	1/2	5/16	1/2	Nil
	International of Cl. Amer. ..	794	Apr., 1937	$563,617	+ $46,024	17	$2,195,243	$2,080,641	+ $114,602	—	—	—	—	—
	Interoceanic of Mexico ..	—	—	—	—	—	—	—	—	1st Pref.	1/2	-/6	1/2	Nil
	La Guaira & Caracas ..	22¾	May, 1937	5,255	— 250	22	28,335	27,880	+ 5,455	Stk.	9	3	7½	Nil
	Leopoldina	1,918	19.6.37	22,280	+ 5,452	25	545.027	413,573	+ 131,454	Ord. Stk.	10½	3½	5	Nil
	Mexican	483	14.6.37	$240,400	— $26,400	24	$7,280,700	$6,253,300	+ $1,027,400	,,	1¼	1/4	1/2	Nil
	Midland of Uruguay ..	319	May, 1937	8,592	+ 2,259	48	96,366	78,833	+ 17,533	,,	1½	1/4	1/2	Nil
	Nitrate	384	15.6.37	5,714	+ 3,746	24	80,419	63,702	+ 16,717	Ord. Sh.	63/6	41/9	2 5/8	Nil
	Paraguay Central	274	12.6.37	$4,243,000	+ $1,474,000	50	$151,563,000	$120,122,000	+ $31,441,000	Pr. Li. Stk.	85	71	80 1 2§	7 7/16
	Peruvian Corporation ..	1,059	May, 1937	80,256	+ 510	48	908,145	866,369	+ 41,776	Pref.	15	9	11	Nil
	Salvador	100	12.6.37	¢22,650	+ ¢14,360	50	¢1,202,008	¢960,336	+ ¢241,672	Pr. Li.Db.	18	16	22½	Nil
	San Paulo	153½	13.6.37	37,067	+ 6,227	24	762,562	689,882	+ 72,680	Ord. Stk.	86	46½	88½	5 5/8
	Taltal	164	May, 1937	3,310	+ 300	48	37,920	38,505	— 585	Ord. Sh.	11 5/32	14/-	11/8	8 7/8
	United of Havana	1,353	19.6.37	20,310	+ 2,352	51	1,372,583	1,208,150	+ 164,433	Ord. Stk.	3¼	1	3	Nil
	Uruguay Northern	73	May, 1937	725	— 87	48	10,860	9,139	+ 1,721	Deb. Stk.	5	3	9	Nil
Canada	Canadian National ..	23,782	14.6.37	709,321	+ 41,884	24	17,236,630	15,488,600	+ 1,748,030	—	—	—	—	—
	Canadian Northern ..	—	—	—	—	—	—	—	—4 p.c.	Perp. Dbs.	76	51	69	5 15/16
	Grand Trunk	—	—	—	—	—	—	—	—	4 p.c. Gar.	104¾	99¾	98½	4 1/16
	Canadian Pacific	17,228	14.6.37	521,400	+ 26,000	24	12,110,600	11,190,200	+ 920,400	Ord. Stk.	16¾	10 15/16	12 1/2	Nil
India.†	Assam Bengal	1,329	31.5.37	38,092	+ 2,662	9	216,660	205,848	+ 10,812	Ord. Stk.	87¾	82¼	74 1/2§	4
	Barsi Light	202	31.5.37	3,082	— 398	9	22,312	22,027	+ 285	Ord. Sh.	77½	65½	47	10 5/8
	Bengal & North Western ..	2,111	31.5.37	99,813	+ 9,118	9	560,698	536,545	+ 24,153	Ord. Stk.	319	292 5/8	300§	6
	Bengal Dooars & Extension	161	31.5.37	3,434	— 168	9	19,406	19,706	— 300	,,	127½	118	100½	5½
	Bengal-Nagpur	3,268	31.5.37	230,850	+ 28,542	9	1,252,125	1,138,006	+ 114,119	,,	104	100¼	90½	4 7/8
	Bombay, Baroda & Cl. India	3,072	10.6.37	270,750	+ 31,200	10	1,993,425	1,873,875	+ 119,550	,,	114	110½	110 2§	5 7/16
	Madras & Southern Mahratta	3,229	31.5.37	194,850	+ 17,422	9	1,035,900	1,031,927	+ 973	,,	116½	108½	107½	7 7/16
	Rohilkund & Kumaon ..	572	31.5.37	17,201	— 1,830	9	109,378	115,435	— 6,057	,,	311	286	303½	5 15/16
	South Indian	2,531¾	31.5.37	127,155	+ 3,481	9	709,317	706,330	+ 2,987	,,	107½	102 5/16	100½	5½
Various	Beira-Umtali	204	Apr., 1937	82,745	+ 22,033	31	501,230	442,973	+ 58,257	—	—	—	—	—
	Egyptian Delta	620	31.5.37	6,293	+ 336	9	37,181	33,972	+ 3,212	Prf. Sh.	21¼	15/8	11/2	Nil
	Great Southern of Spain ..	—	—	—	—	—	—	—	—	Inc. Deb.	1½	1/8	3½	Nil
	Kenya & Uganda	1,625	May, 1937	216,935	— 20,539	22	1,334,126	1,229,899	+ 104,227	—	—	—	—	—
	Manila	—	—	—	—	—	—	—	—	B. Deb.	50½	37	45	7¾
	Midland of W. Australia ..	277	Apr., 1937	13,052	+ 455	43	132,650	137,462	— 4,812	Inc. Deb.	97	93½	95	4 5/16
	Nigerian	1,905	1.5.37	58,777	+ 23,828	5	314,220	157,301	+ 156,919	—	—	—	—	—
	Rhodesia	2,451	Apr., 1937	410,583	+ 130,476	31	2,520,488	2,006,253	+ 514,235	4 p.c. Db.	107	103½	107½	3¾
	South Africa	13,263	29.5.37	604,094	+ 90,055	9	5,193,364	4,838,729	+ 354,635	—	—	—	—	—
	Victoria	4,728	Nov., 1936	868,988	+ 45,953	21	3,995,540	3,959,297	+ 36,243	—	—	—	—	—
	Zafra & Huelva	112	Apr., 1937	13,304	+ 4,300	17	57,316	39,754	+ 17,562	—	—	—	—	—

NOTE.—Yields are based on the approximate current prices and are within a fraction of 1/16.

† Receipts are calculated @ 1s. 6d. to the rupee. § ex dividend. Salvador and Paraguay Central receipts are in currency.

The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the Sterling weekly receipts at the par rate of exchange has proved misleading, the amount being overestimated. The statements are based on the current rates of exchange and not on the par value.

Electric Railway Traction

The London-Portsmouth Electrification, Southern Railway

THE early history of the direct route to Portsmouth was remarkable in that the company which built the vital link between Godalming and Havant appears to have had no other intention than to sell it, when finished, to the competing L.B.S.C.R. and L.S.W.R. systems, whichever was the higher bidder. Agreements between these railways prevented either making a purchase in the open market, and a covert leasing bargain on the part of the South Western led to much friction at Havant (where the Brighton took up some of the rails to prevent South Western trains going through) followed by a long legal battle. Eventually, in January, 1859, South Western trains began to run through to Portsmouth via the Direct route, almost six years after the Parliamentary authority for the construction of the line had been obtained.

Built very cheaply, the Godalming—Havant line followed the lie of the land, and the long 1 in 80 grades and sinuous route which resulted from this policy have been regretted ever since, for they have not been conducive to easy locomotive working or strict punctuality during the heavy summer traffic to Southsea, Hayling Island and the Isle of Wight. Thus it is that the operating benefits conferred by electrification are of great importance, for the electric trains can maintain steadily a relatively high uphill speed, and can accelerate quickly from signal checks on difficult parts of the line.

It was in November, 1935, that the decision to electrify the Portsmouth and Aldershot routes was officially announced, although such a move had been more or less expected for some months previously, and it has taken only 20 months to complete the electrification of 95 route and 242 track miles and open them to a dense public service. This electrification (Hampton Court junction to Portsmouth Harbour, Woking to Alton, and Weybridge to Staines) comprises but a part of the Southern Railway's conversion programme drawn up as a result of Government guarantees, the total mileage sanctioned for electrification being upwards of 250. The essence of the agreement with the Government was that the Exchequer would guarantee the principal and interest of a loan, and that as far as practicable, all the plant, machinery and materials for the conversion should be manufactured in the United Kingdom. The estimates for the conversion of the lines considered in this Supplement showed a cost of nearly £3,000,000, equivalent to about £31,000 per route mile and about £12,000 per track mile, which, it will be agreed, are very low figures when it is considered that they include the provision of 312 new or rebuilt motor-coaches and trailers.

The conversion of the Portsmouth and Aldershot routes adds further to that great structure of Southern electrification envisaged more or less as a whole by Sir Herbert Walker many years ago, and for the completion of which he has laid all the foundations. And these new electrifications form a fitting swan-song for one who has been a staunch advocate of suburban and interurban electrification since pre-war days, and for whose perspicacity of judgment there is abiding evidence.

Sir Herbert has been fortunate in his chief officers, all of whom have been associated with him since the railway amalgamation, and to one of these also, Mr. R. E. L. Maunsell, the Chief Mechanical Engineer, the work of the Portsmouth electrification has been a swan-song, for he is to retire at almost the same time as Sir Herbert Walker. Mr. Maunsell's electric traction experience dates back to pre-Southern days, for he collaborated closely in the far-reaching proposals of the South Eastern & Chatham Railway for the electrification of main and suburban lines at 1,500 volts d.c. To the prescience of Mr. Alfred Raworth, the Electrical Engineer for New Works, must be credited much of the ease and rapidity with which successive electrifications have been carried out, and he too must have envisaged the proportions to which Southern electrification would rise in less than two decades. To Mr. Ellson, the Chief Engineer, and his staff, credit is also due for the rapid execution of the civil engineering works, the laying of conductor rails and cables, and the extensive modifications to the signalling system. It says much for the organisation of a department that such a miscellaneous collection of works can be carried out at speed coincident with activities like the construction of the Wimbledon fly-over and the Waterloo re-signalling.

At the recent meeting in Paris of the International Railway Congress, one of the sub-questions dealt with the extent to which train services could be arranged to suit the fluctuating amount of electric energy available throughout the day, but such a bent towards making conditions easier for an electricity supply company rather than for the public has never been a feature of the Southern, and the timetables arranged by Mr. E. J. Missenden, the Traffic Manager, and his staff, not only give a frequency of service throughout the day never before approached on the Portsmouth line, rising to 90 express and 70 stopping trains on Saturdays, but include standardised times and accelerated schedules. Moreover, the Traffic Department has not been slow to take advantage of the electric trains, and since the Naval Review at Spithead, frequent reliefs and specials have been handled by electric stock. Our thanks are due to the officers named above and to Mr. C. Grasemann, the Public Relations and Advertising Officer, for their assistance in compiling the following account of the Southern Railway's greatest electrification scheme.

Power Supply and Distribution

Finchdean substation on Portsmouth Direct line

AN interesting feature of the Portsmouth electrification has been the rapidity with which the conversion work has been accomplished. From June 27, 1935, when instructions to proceed were given, 26 substations were built and equipped and 242 track miles were electrified in just over 20 months, and electric trial trains began to run to Portsmouth on March 8, 1937.

As an illustration of the intensity of the erection work, it may be mentioned that three complete substation equipments were unloaded per month, each equipment forming a train of 18 wagons complete with a 36-ton breakdown steam crane and brake van. The unloading usually was carried out between 11 p.m. on Sunday and 4.30 a.m. on Monday. During the period between December, 1935 and November, 1936, 188 cable trains were employed in laying 309 miles of single-core 33 kV. cable and 218 miles of pilot cable.

Supply and Distribution

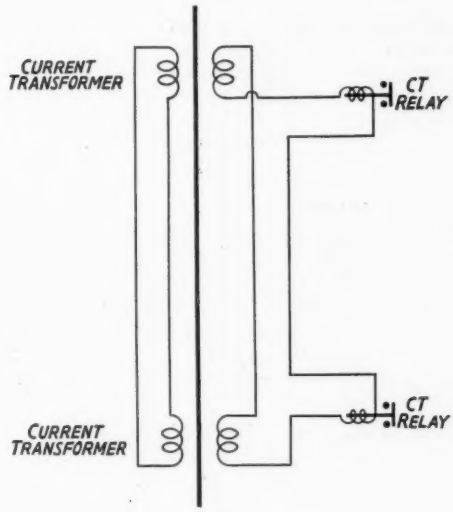
For the operation of the new electric services the power supply is obtained from the Central Electricity Board's grid substations at Byfleet and Portsmouth (Wymering). In addition, at the railway's own generating station at Durnsford Road, Wimbledon, an existing 5,000 kW. turbo-alternator has been replaced by a 12,500 kW. set. The increased traction supplies in the Western suburban area have been provided by an additional rotary converter substation at Durnsford Road, the equipment for which was taken from the existing substation at Guildford, where a rectifier has been installed.

Work train containing complete electrical equipment for one substation

The grid supply is made available at 33 kV. three-phase 50 cycles following the established precedent. This power is distributed to unattended substations on a 33 kV. ring main cable system where mercury arc rectifiers convert the electrical energy to 660 volts d.c. These substations are operated by supervisory control from central points.

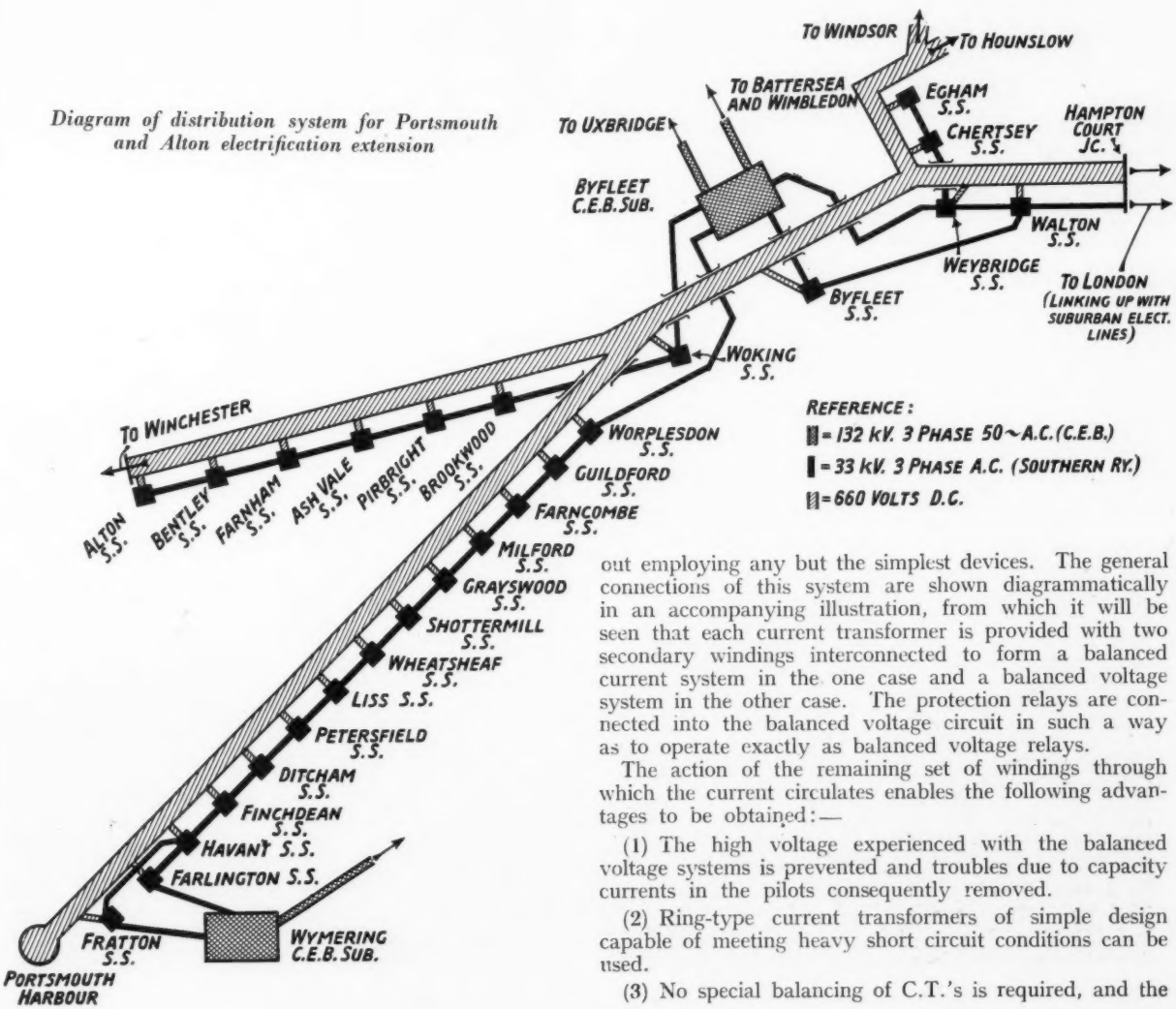
The high-tension and pilot cables are run, as usual, in wooden troughs supported on concrete posts, except where local conditions necessitate their being laid in concrete ducts, as, for instance, at level crossings and stations. The 33 kV. power cables consist of three single-core paper-insulated lead-covered cables, compounded and served. They are laid in the troughing in triangular formation and are transposed at regular intervals. The last section of cable which actually leads into the substation is, however, three-core and armoured. A dry-core paper-insulated lead-covered and armoured pilot cable is laid with the power cables together with a four-core impregnated paper cable for the e.h.t. feeder protective system. The dry core pilot is a 17- or 33-core cable, depending on its location with respect to the central control room.

The feeder protective system is of the differential type, being a combination of the circulating current and balanced voltage systems, and secures the advantages of both these methods without introducing any new difficulties, and without employing any but the simplest devices. The general connections of this system are shown diagrammatically in an accompanying illustration, from which it will be seen that each current transformer is provided with two secondary windings interconnected to form a balanced current system in the one case and a balanced voltage system in the other case. The protection relays are connected into the balanced voltage circuit in such a way as to operate exactly as balanced voltage relays.



Balanced feeder protection circuits

Diagram of distribution system for Portsmouth and Alton electrification extension



The action of the remaining set of windings through which the current circulates enables the following advantages to be obtained:—

(1) The high voltage experienced with the balanced voltage systems is prevented and troubles due to capacity currents in the pilots consequently removed.

(2) Ring-type current transformers of simple design capable of meeting heavy short circuit conditions can be used.

(3) No special balancing of C.T.'s is required, and the

usual air gaps which are sensitive to their location are not required.

(4) Increased stability without sacrifice of sensitive settings.

(5) Very small circulating currents, with consequently a small section of pilot cable, can be used.

Substations

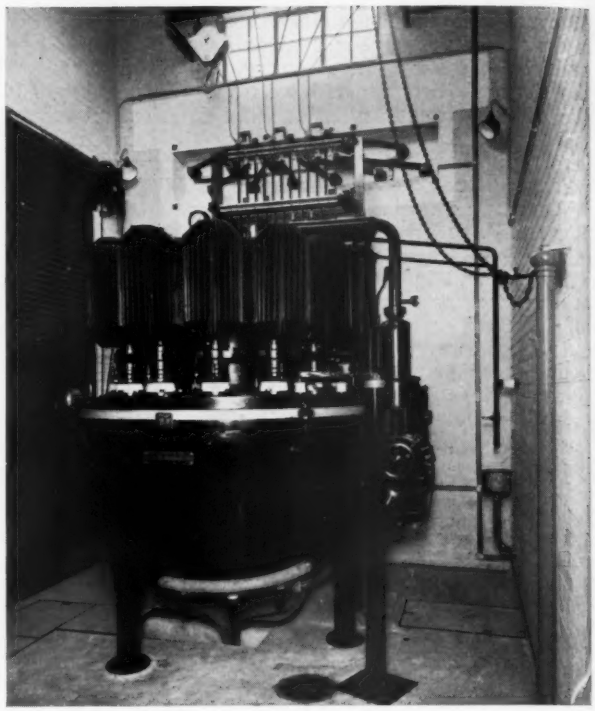
In all, 26 substations and 18 track-paralleling huts have been built, which are remotely controlled from two control rooms located at Woking and Havant respectively. Woking control room controls the area north of Liss and the substations south of that point are controlled from Havant. The substations are of identical design to those on previous extensions and consist of two sections:—

(*a*) An e.h.t. switchgear outdoor structure section.
(*b*) A rectifier and l.t. switchgear building.

The substations are all identical in their general layout except where special conditions require the addition or omission of an e.h.t. feeder, as at Weybridge, Pirbright, Chertsey, Egham, Guildford, Havant and Ash Vale, or where an additional rectifier was installed, as at Fratton substation.

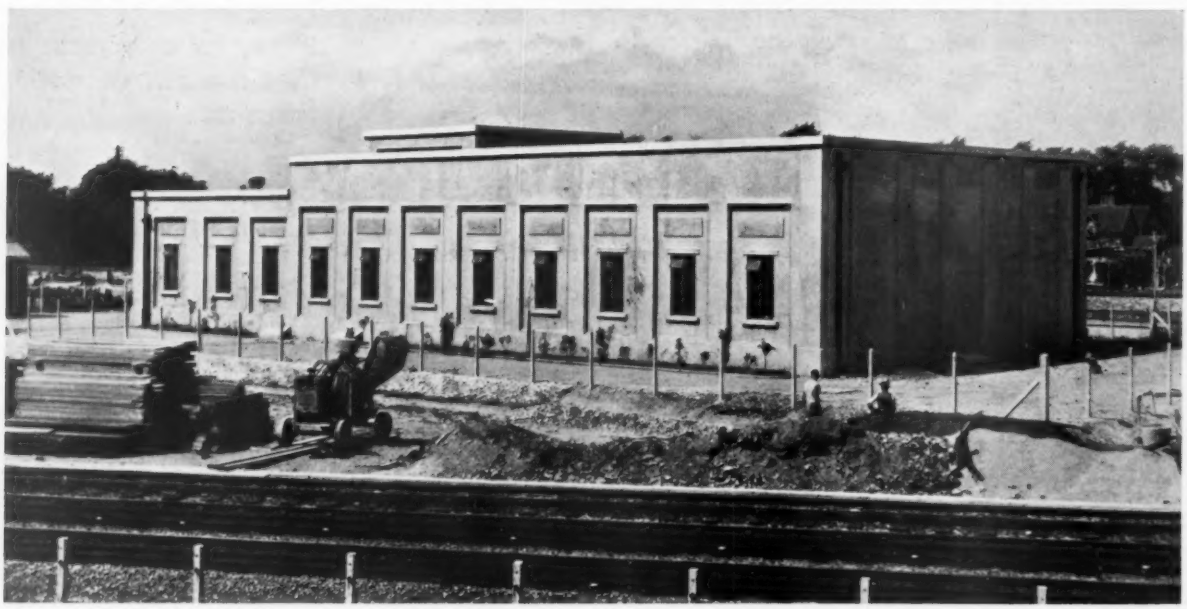
Outdoor Gear

The e.h.t. switchgear is erected on reinforced concrete structures screened from unauthorised access by an unclimbable fence. Normally there are three oil circuit breakers each of 500,000 kVA. rupturing capacity—two for the sectionalising and selective protection of the ring main, and one controlling the supply to the rectifier transformer. Adequate facilities are provided for local isolation and sectionalising by the isolating switches supported on the concrete cross beams. Ample clearances are thereby obtained for cleaning and inspection of all parts of the plant. These cross beams also support a busbar system which links up the two incoming feeders, and from this busbar a tee off connection is taken through the above-mentioned rectifier transformer oil switch to the unit in question. This transformer stands against the end wall of the substation building and its purpose is to step down the 33 kV. three-phase supply to a double six-phase supply at the voltage required by the anodes of the rectifier. All the insulators on the outdoor e.h.t. gear are designed for a working voltage of 44 kV. and the circuit breakers for 350 amp. at 44 kV.

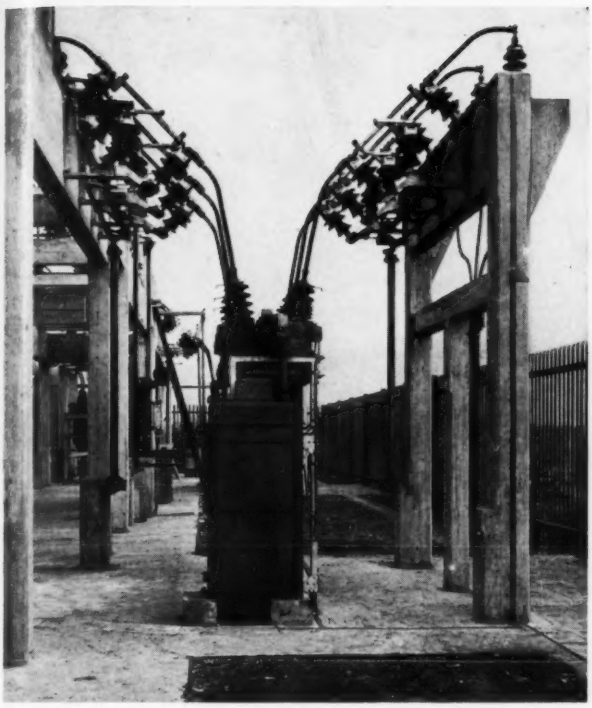


View of 2,500 kW. rectifier showing high and low vacuum pumps

Auxiliary supplies are provided by single-phase 20 kVA. transformers which are connected through switch fuses from each of the two incoming feeders, and a three-phase 30 kVA. transformer similarly connected to the busbars.



Exterior of Havant control room



33 kV. outdoor switchgear and isolators

The single-phase transformers provide the current for signalling, oil-switch operation, lighting and other auxiliary purposes. Duplicate transformers are provided to ensure continuity of supply in the event of failure of either feeder, and by virtue of the position in which they are connected they also serve as potential transformers for the purpose of synchronising the two feeders. The 30 kVA. three-phase transformer provides the auxiliary supply for the mercury arc, rectifier substation heating, and lighting, &c.

All e.h.t. oil circuit breakers are interchangeable. The power for operating them is provided by two strong springs which are compressed by a ¼ h.p. single-phase motor mounted in the operating pedestal; as soon as the breaker is closed and the springs have been released the motor automatically starts up and re-compresses the springs ready for the next operation.

Indoor Gear

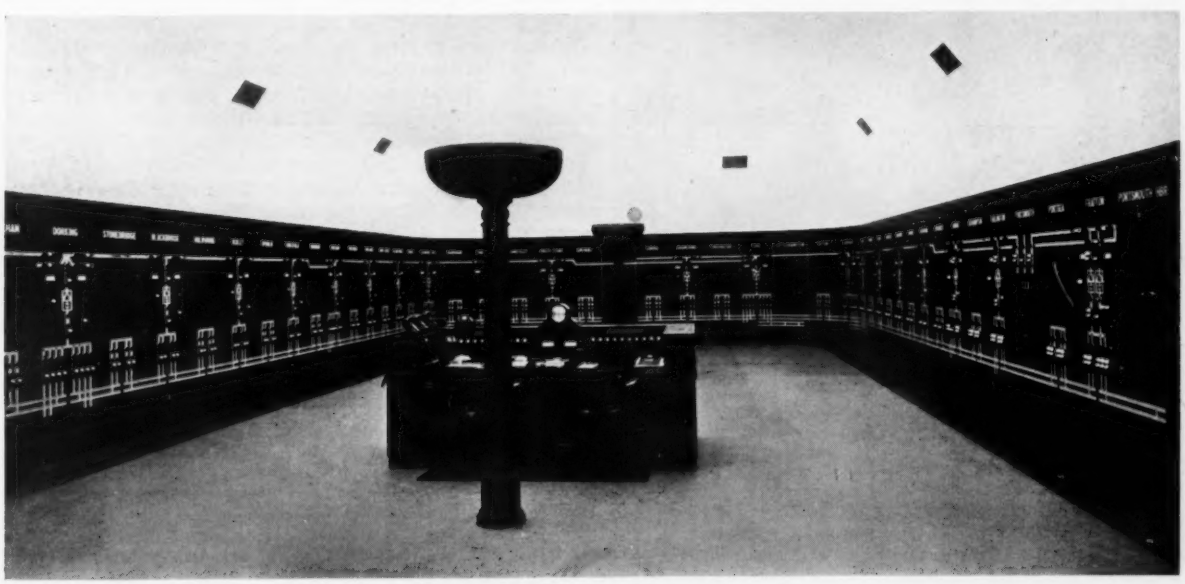
The substation building has been designed to house in the most convenient manner the mercury arc rectifier plant, the d.c. high-speed circuit breakers which control the d.c. energy to the track feeders, and other auxiliary equipment.

The rectifiers are of the steel tank type and are duplicates of those installed on the Sevenoaks—Eastbourne and Hastings schemes. The continuous rating is 2,500 kW., corresponding to 3,790 amp. at 660 volts on the d.c. side. Higher currents can be produced for shorter times up to a momentary maximum of 12,000 amp. The rectifier equipments are provided with a closed circuit water cooling system thermostatically controlled. This cooling equipment is housed in an annexe built on to the back of the substation building. The rectifier is completely automatic in its operation, through the medium of a master controller which is started up when the rectifier transformer oil circuit breaker is closed, and which controls every operation required.

The complete substation can be changed over to local operation if so desired, and control has been centralised in a three-panel switchboard which also houses various auxiliary transformer equipment associated with the rectifier itself. The three panels control the e.h.t. switchgear, the rectifier and the auxiliary services respectively, and give visual indication should any failure occur.

The positive connection from the cathode of the mercury arc rectifier is taken along a trench in the floor to a d.c. circuit breaker room. Here it is taken through a main 4,000 amp. high-speed circuit breaker and thence to a busbar from which connection is made to the track feeders through smaller 2,500 amp. high-speed circuit breakers. The latter breakers are arranged to trip on forward current whereas the main breaker trips on reverse current.

The local control equipment for each track feeder circuit breaker is mounted on a panel placed below the



Interior of the Havant control room

concrete shelf carrying the circuit breakers. Normally the feeder breakers are closed by current obtained from the 660-volt busbar but certain units are provided with arrangements for closing from the tracks when the respective rectifier is not in operation. The negative feeders connected to the track rails return the current to the negative busbar located near the main transformer, to the neutral point of which it is connected through the absorption coils.

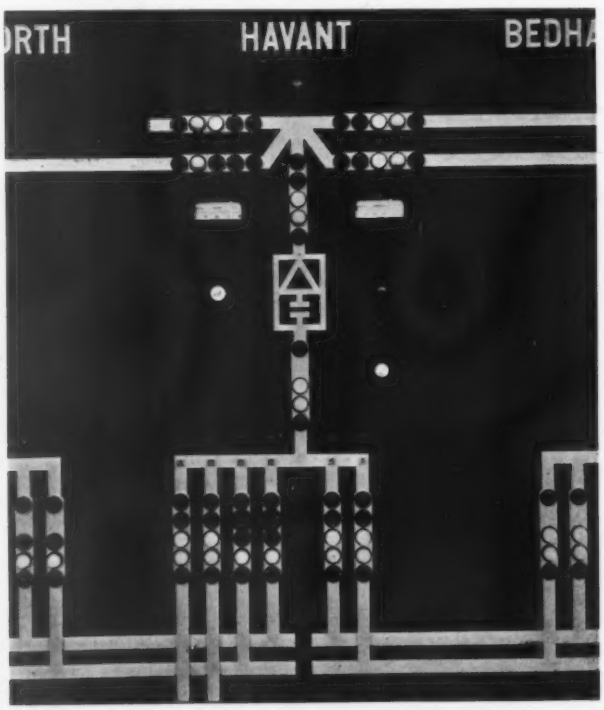
Remote Control

With the same supervisory system as before, the design of the new control rooms is similar to that of the Swanley and Ore equipments. Thus the new Woking and Havant control rooms contain switchboards arranged along a curved wall on which are represented diagrams of the whole of the main power circuits for the supply of energy to the conductor rails, made up of mimic busbars and switch units. Each panel represents a substation, track-paralleling hut or C.E.B. supply substation, 40 panels being located at Woking and 14 at Havant. Woking control room will eventually control also the Reading extension, requiring 26 additional panels, and Havant the Dorking to Portsmouth *via* Horsham extension, requiring 44 additional panels.

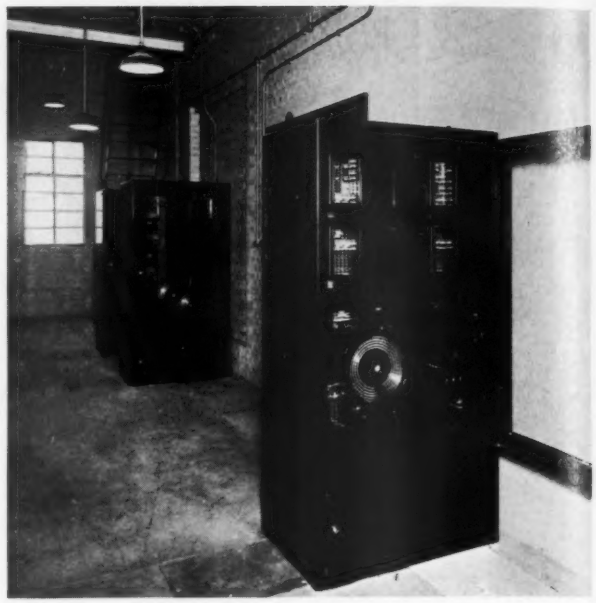
The arrangement of the switchboards in the manner described above enables the necessary functions to be carried out in the most effective and convenient manner, the most important of which are:—

1. Operating and indicating the h.t. oil switches and d.c. high-speed circuit breakers.
2. Remote metering of the d.c. and voltage.
3. Fault signalling when the position of any switch does not agree with the indication of the switch at the control room.
4. Telephonic communication between all substations and control rooms.

While the main control boards are the chief operating



Substation panel at Havant control room



Transmitter cabinets for supervisory control

medium there are other essential features of the supervisory control equipment, each forming an important link in the complete system. These are as follow:—

Control Desk.—This is centrally placed in the control room and contains a telephone exchange, indicating relays and alarm bells for fault signalling, and meters for reading substation battery voltages, as well as for detecting defects in the supervisory pilot cables.

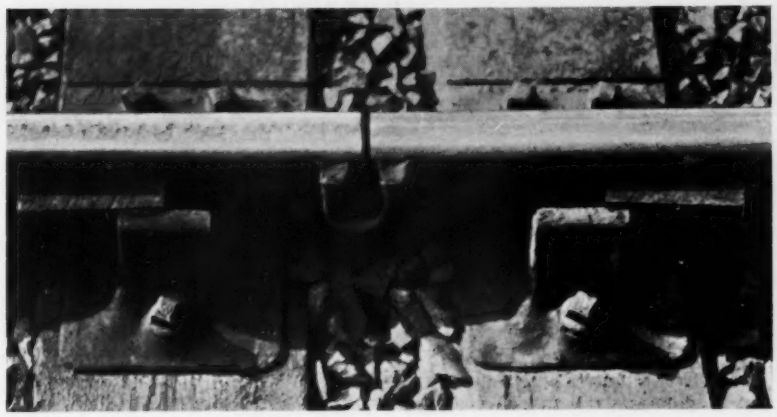
Transmitter Cubicles.—These cubicles house the transmitter with its auxiliary relays, polarised relays, &c., and all apparatus for the transmission of orders as well as the reception of indicating impulses between the control room and the remote controlled substations. Each transmitter cubicle controls two substations.

Control Room Auxiliaries.—These comprise two motor-generator sets with automatic starters, one driven by a 660-volt motor from the track and the other by a.c. obtained by the high-tension supply; two 120-volt storage batteries, and a switchboard which serves to supply and distribute operating current for the main control board, transmitter cubicles, and control desk. The batteries are kept automatically charged by the motor-generator sets and are so arranged that in the event of both motor-generator sets failing, the two batteries are consecutively connected to the busbars. A complete standby operating supply is thus available for a considerable period should the main power supply fail.

Receiver Cubicles.—These are provided in each substation and form the selective link between the supervisory pilots and the apparatus under control. In these cubicles are mounted the receiver with its attendant relays, the polarised operating relays, &c., for the execution of orders and the fault indicating relays and the fault transmitter.

Substation Auxiliaries.—For the operation of the supervisory equipment in the substations a metal rectifier and battery is provided.

Operating Cables.—Multicore cables transmit the impulses between the control room and the substations. Each selector requires four conductors and one common return,



Welded type of bond adopted in conjunction with strip bond for the negative current returned through the running rails

and as two substations are operated on each selector the number of cores required is consequently determined. For convenience these are grouped into one cable which is looped into a number of substations in series. Three sizes of cable have been standardised for the supervisory system, namely, 33-, 17-, and 12-core cables.

Method of Operation.—The remote control system operates on what is known as the selector principle, where a selector consists of faceplate selector switches arranged to rotate in synchronism over 50 separate positions. One switch is at the transmitting end and two selector switches operate in tandem at the substation end of the operating cable of each individual selector. That is, two separate substations are connected to each selector, and the system has been so arranged that no two adjacent substations are connected to the same selector.

By means of the main control boards it is possible to select any switch it is desired to operate. This is done by operating a calling key on the switch unit, upon which a white lamp incorporated in the mimic switch will light up when the selector switch reaches the corresponding position of that of the key depressed. The operating of this switch can now be performed by a second key on the switch unit which is mounted between a red and a green indicating lamp. Correct operation is indicated by the lighting of these lamps depending upon whether the switch is closed or open. For the operation of the e.h.t. feeder oil switches an additional lamp is provided to indicate synchronism or otherwise between the two respective supplies.

When a circuit breaker trips due to a fault, the fact is signalled to the control room by the ringing of a bell and the flashing of the clear lamp at the top of the panel belonging to the particular substation. At the same time a coloured shutter is exhibited at the control desk. These conditions continue until the control room attendant has operated a resetting key. To discover which of the switches has automatically operated, a checking key is operated on the substation panel in question which causes the selector arm to rotate once round the faceplate and connect in succession each one of the switches in the substation to its particular unit in the control room. When the selector arm passes over the contacts corresponding to the switch that has tripped, the indication on the control panel will change from red to green. By selecting this particular switch the attendant can then clear the fault indicated by either reclosing the switch or confirming its position by moving the key. Artificial indirect lighting is used for the illumination of the control rooms and is provided by two pedestal lamps, each supporting a bowl fitting containing three 500-watt lamps. These rooms are also artificially air-conditioned, the temperature being thermostatically controlled so as to maintain an equable temperature in one or other of three stages.

Conductor Rails and Track Equipment

The conductor rails are of the Southern Railway standard flat-bottomed section and weigh 100 lb. a yd. They are supported on porcelain insulators of which there are generally about 620 to the mile. The rails are normally in 60-ft. lengths and are bonded together by four copper bonds, having a total cross-sectional area of 1·66 sq. in. The negative traction circuit is provided by the running rails, each point of which is bonded together by two bonds, one protected type bond inside the fish plate and one welded bond as shown in two of the accompanying illustrations. The aggregate cross-sectional area is 0.332 sq. in. Sections of the conductor rail can be isolated by means of hook switches which are provided between the feeders and the conductor rails.

Track-paralleling huts are placed midway between substations and contain groups of high-speed circuit breakers depending on the number of tracks. These breakers are automatic in operation and their purpose is to parallel the tracks to take advantage of all the cross-sectional area of the conductor rails and thus reduce voltage drop to a minimum.

Contractors for Electrical Equipment

Asea Electric Limited
British Insulated Cables Ltd.
British Thomson-Houston Co. Ltd.
Bruce, Peebles & Co. Ltd.
Chloride Electrical Storage Co. Ltd.
English Electric Co. Ltd.
Estler Bros. Limited
Pirelli-General Cable Works Limited
Taylor, Tunnicliff & Co. Ltd.
Henley's Telegraph Works Co. Ltd.
Simplex Conduit Co. Ltd.
Johnson & Phillips Limited
Docker Bros. Limited
General Electric Co. Ltd.
Veronese Limited
Edmondson's Electricity Corporation Ltd.
Elliot Bros. Limited
Parminter, Hope & Sugden Limited
W. T. Glover & Co. Ltd.
Siemens Electric Lamps & Supplies Limited

Signalling Arrangements

AS on the main line to Brighton, electrification has been accompanied by a number of interesting and important signalling improvements, re-arrangement of lines, the provision of new crossovers, siding connections and other facilities have necessitated corresponding signalling modifications at many places, such as Aldershot, Alton, Farnham, Guildford, Haslemere, Havant, Fratton and Portsmouth. Opportunity has been taken to concentrate the working wherever possible, reduce the number of signal boxes, re-space signals and facilitate block acceptance where manual signalling remains in force. For these purposes many new signals, both running and shunt, have been erected in suitable positions, and in numerous instances telephone communication with signal boxes has been provided, while a number of old signals have been removed. New calling-on signals have been provided where necessary.

At Portsmouth Harbour station multiple-aspect colour-light signalling has been installed, extending to the up outer home and down starting signals for Portsmouth Yard; Burnaby Road box, formerly a block post with siding and crossover, has been converted to act as a ground frame controlled from the Harbour. The new down inner home signal has a 6-way theatre-type route indicator. Ground signals are of the floodlit pattern, already in use between Waterloo and Hampton Court Junction. Complete track circuiting is provided.

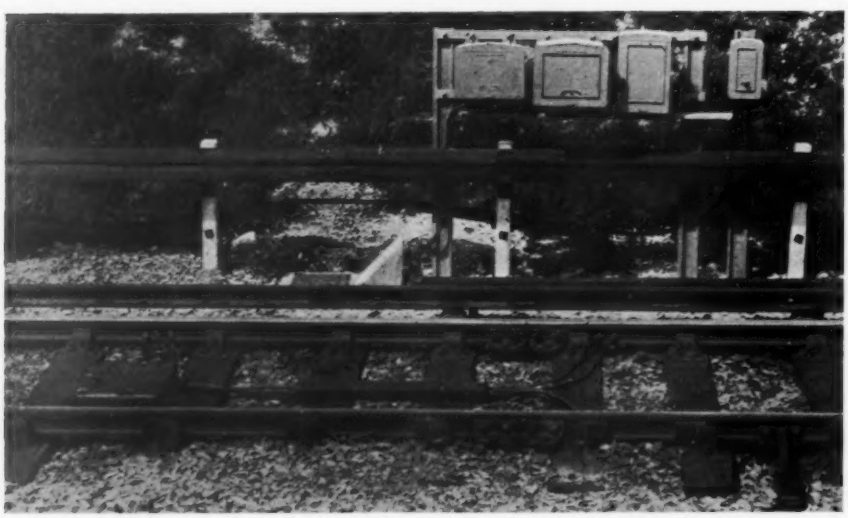
Considerable re-arrangement of crossovers and connections has been effected at Fratton. One of the sidings between there and Portsmouth has been resignalled as a down relief line. Between Fratton and Portcreek Junction additional intermediate signalling, using semaphore signals, has been installed to provide shorter block sections. Between Farlington Junction and Havant multiple-aspect colour-light signalling has been adopted and ordinary block working abolished, to achieve the same object. None of the signals is purely automatic. Telephones are provided at most of them but no " P " signs. Stockheath crossing box is simply a gate box and Bedhampton Mill a ground frame. Bedhampton Crossing has a closing switch.

On the Direct Line above Havant much interesting work is to be seen. Between Rowlands Castle and Petersfield additional intermediate signalling sections called Woodcroft have been put in on both lines between Buriton Siding and Idsworth Crossing boxes, using 2-aspect colour-light signals. Between Liss and Liphook similar 2-aspect colour-light signals, known as the Langley signals, have been put in on both lines, while between Haslemere and Witley the same arrangement has been applied to make an intermediate up-line section point at Grayswood. At Haslemere station the re-arrangement of the lines and introduction of new crossovers has necessitated corresponding signal modifications.

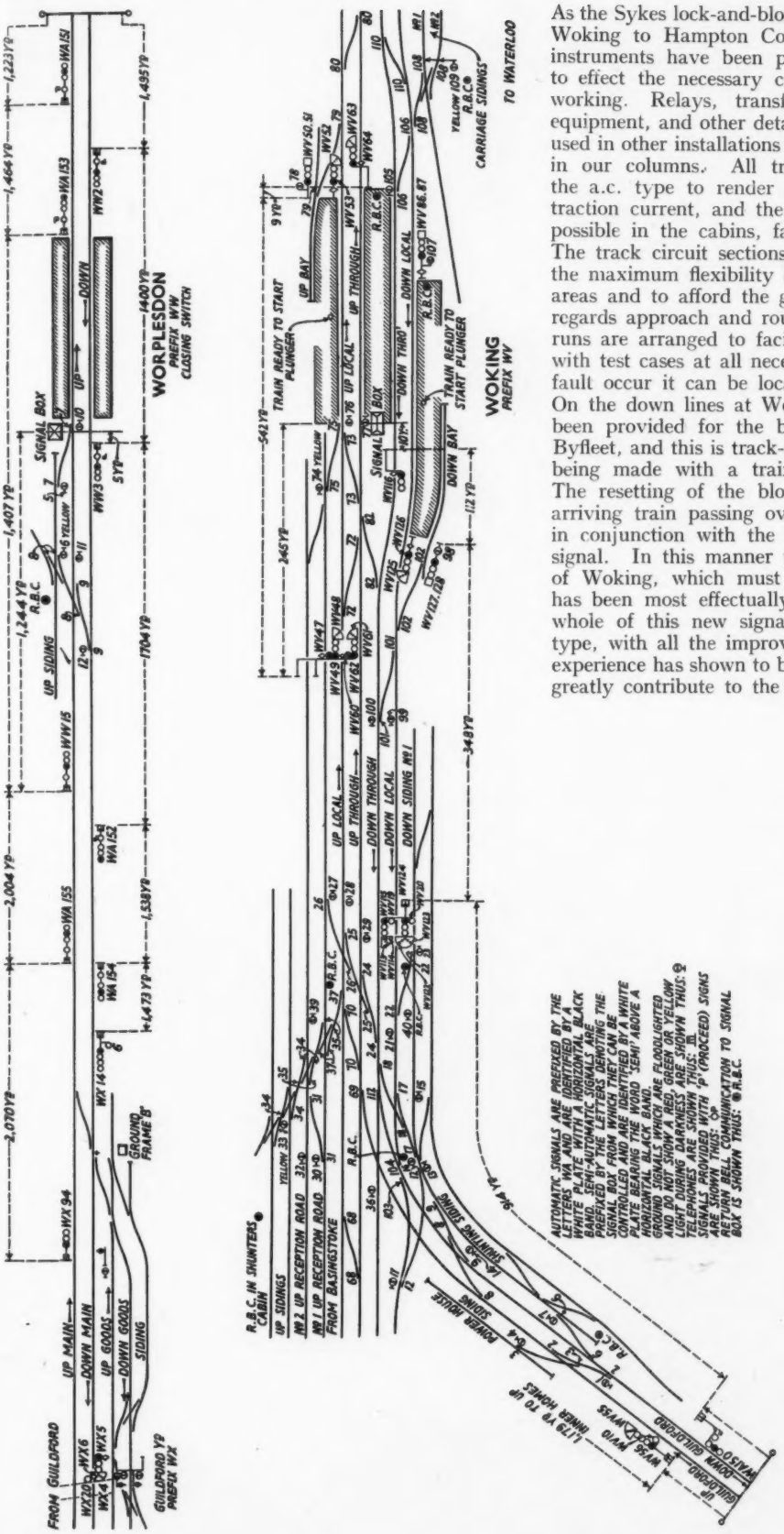
Extensive alterations have been made at Guildford. The North box has been abolished and ground frames provided near the Alton and Goods lines, the working now being controlled from the Yard and South boxes. On the main lines semaphores have all been replaced by multiple-aspect colour lights, with junction indicators when required. Track circuits are provided throughout, with the necessary electric locking and detection, added to work in conjunction with ordinary lever frames, as at Portsmouth Harbour. Thence to Woking, on the main line through Worplesdon, colour-light automatic signalling is in use, with the usual equipment, including " P " signs at most of the signals. Worplesdon box has been retained but is normally switched out. This work joins on to what is probably the most interesting of all the new signalling, that at Woking.

Three mechanical signal boxes, Woking East, West, and Junction have been abolished and the whole of the working concentrated in a power signal box at the west end of the through lines platform, with an all-electric frame, similar to those in use elsewhere on the system, having the usual electric locking and full track-circuit controls. Here again all running signals are multiple-aspect colour-lights, with direction indicators, or theatre-type route indicators, as circumstances require. Ground signals are floodlit.

The signal aspects throughout the work are in accordance with the principles adopted some time ago by the company and given in THE RAILWAY GAZETTE for May 29, 1936.



Track apparatus, cases, insulated rail joints, impedance bonds, negative return bonds and positive connecting feeders for third rail on the Portsmouth electrified lines



Automatic signalling, Guildford to Woking, with greater part of new layout at Woking station

As the Sykes lock-and-block remains in use at present from Woking to Hampton Court Junction, special all-electric instruments have been provided in the new power box to effect the necessary control and ensure continuity of working. Relays, transformers, track diagrams, track equipment, and other details are of the same general types used in other installations on the line and already described in our columns. All track circuiting is necessarily of the a.c. type to render it free of interference from the traction current, and the relays are grouped as much as possible in the cabins, facilitating wiring and inspection. The track circuit sections have been arranged to provide the maximum flexibility of train movement in signal box areas and to afford the greatest measure of protection as regards approach and route locking. The cable and wire runs are arranged to facilitate maintenance and provided with test cases at all necessary points, so that should any fault occur it can be localised with the utmost despatch. On the down lines at Woking co-operative cancelling has been provided for the block apparatus which works to Byfleet, and this is track-controlled to prevent any mistake being made with a train waiting at the home signals. The resetting of the block is also accomplished by the arriving train passing over certain track circuit sections, in conjunction with the restoration of the relative home signal. In this manner the older form of working north of Woking, which must be kept in service for a time, has been most effectually combined with the new. The whole of this new signalling equipment is of the latest type, with all the improvements the company's extensive experience has shown to be desirable, and will undoubtedly greatly contribute to the success of electrification.

✱

Civil Engineering

THE works undertaken by the Department of the Chief Engineer, Mr. George Ellson, in connection with the Portsmouth electrification have been many and varied, though the largest—the complete rebuilding of Woking station, including extensive permanent way alterations—was not wholly necessitated because of electrification, but was carried through coincidently with conversion in order that the improved layout should be available for the 1937 summer traffic, which will be supplemented by the more frequent Portsmouth service. Havant station, also, is being completely rebuilt, and the level crossing there replaced by an overbridge carrying an arterial road. Here again, however, the station was due for rebuilding irrespective of electrification. As rebuilt, there will be four through roads with two platform faces, in addition to a bay platform for the Hayling Island trains.

Platform and station building alterations have also been carried out at Esher, West Weybridge, Walton, Byfleet, Guildford, Godalming, Haslemere, Rowlands Castle, Fratton, Portsmouth & Southsea, and Portsmouth Harbour stations. Platforms 800 ft. long to accommodate 12-car trains now exist at Woking, Guildford, Haslemere, Havant, Portsmouth & Southsea, and Portsmouth Harbour.

To accommodate the electric trains new carriage sheds have been provided at Wimbledon (where the existing one has been extended as well), Fratton and Farnham, and at the two first-mentioned places carriage washing plants are being installed. The existing repair shed at Wimbledon has been extended and additional carriage sidings with facilities for cleaning provided at Chertsey, Woking, Portsmouth and Guildford. The carriage sheds are of the pattern now standard for electric stock on the Southern Railway, and details of their construction are shown in one of the accompanying drawings. They are 820 ft. long and have four roads within a width of 60 ft. The framing of steel is covered with Big Six corrugated asbestos sheeting with ample glass lighting. The equipment includes hot and cold water supplies, vacuum cleaning plant for the car interiors, and a complete

Interior of car shed at Fratton under construction

Above : One of the latest type of cattle guard used at level crossings in the country to prevent cattle straying on to the conductor rail

Left : Portsmouth Harbour station showing platform extensions and the new retaining wall supporting the embankment on which the lines are carried to the pier on which the Harbour station stands

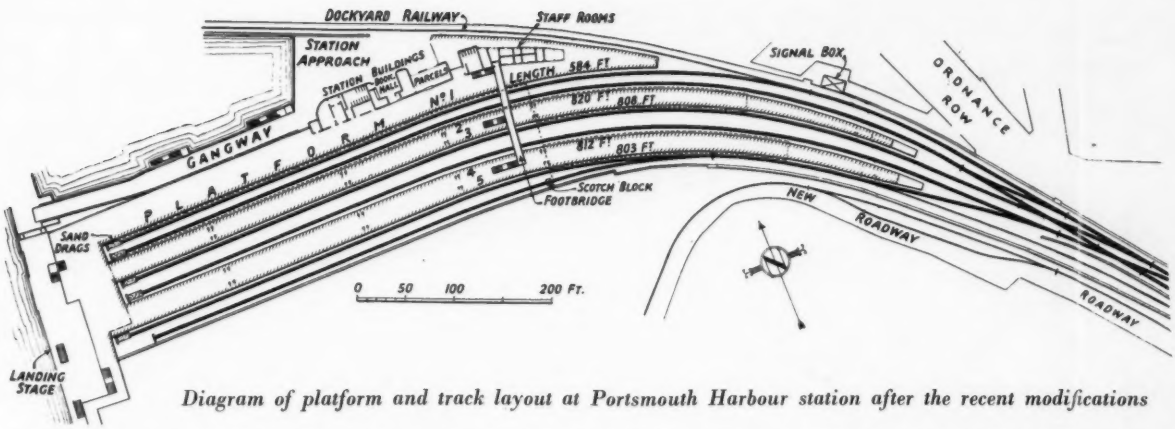


Diagram of platform and track layout at Portsmouth Harbour station after the recent modifications

drainage system on the floor. Occupation and other level crossings have been provided with effective cattle guards, and standard 10-wire fencing has been erected on an extensive scale.

Traffic to the Isle of Wight has developed so rapidly during the last ten years and more that progressive improvements have had to be made at Portsmouth Harbour station in order to cope with it, and at the terminal end of the platforms the means of transfer between train and boat are now probably as efficient as it is possible to make them within the limited space available. The work that has had to be done directly in connection with electrification has been that of extending four of the five platforms to accommodate the new 12-car trains and improving the curvature at the outer ends of the platforms. This has meant some difficult work in widening the approach viaduct and rearranging the permanent way layout, and the fact that the whole of this work was completed far enough to deal with 20 full-length electric trains for the Naval Review traffic on May 20 without its having been allowed to interfere with normal traffic is typical of the smart work the Southern Railway engineers are now practised in carrying out.

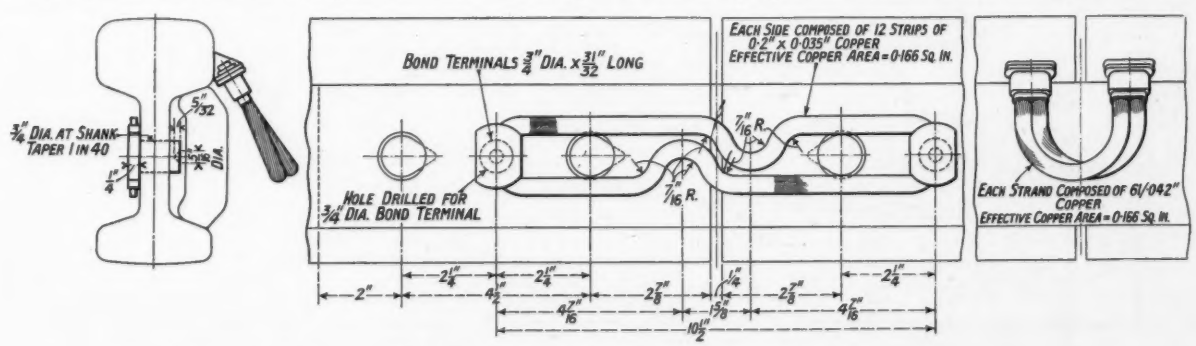
Portsmouth Harbour station is approached from the town on a brick viaduct sharply curved immediately north of the Harbour station. Here a connecting spur led down to the naval gun depot and this connection has been reconstructed in a new position. The widened lines immediately approaching the platforms are supported on an earth-filled embankment between retaining walls, one of which had to be renewed. In order to assure the readiness of the essential facilities to cope with the summer traffic, work on renewing the booking offices and other station buildings at the Harbour station will not be put in hand until the autumn.

The station now has all five platform faces served by electrified tracks, and there is one electrified siding adjacent to No. 5 platform. Practically all the station area is supported on an iron pier above the water, and a number of girders and screw piles have had to be extended or strengthened. The roofing has been extended by 200-250 ft., and now covers 620-650 ft. of the platform lengths.

At the Portsmouth end of Fratton station the tracks have been rearranged so that what was formerly siding has now been made a down relief line to Portsmouth. Connections have been laid to the new carriage shed and cleaning plant. Certain modifications have also been made to the approach to Portsmouth & Southsea station, and in the through part of that station, which deals with the main-line trains to the Harbour, the island platform has been lengthened to 800 ft.

Other permanent way alterations necessitated by the new type of traffic brought by electrification are those at Haslemere and Guildford on the Portsmouth Direct line, and, on the other section included within this particular scheme of electrification, at Alton and Aldershot. In addition, minor alterations, such as the removal of crossovers from between the platforms, have been carried out at a number of places. The main feature at Haslemere is the provision of a facing crossover from the down to the up line at the north end of the station and a trailing crossover from up to down at the south end, arranged so that a down slow train can be brought in to the up platform to clear the down for an express, while at the same time any up train due can be put through the up loop.

In addition to the signalling, which is dealt with in a separate section, the work of the engineering staff included the erection of two control rooms (at Woking and Havant), 26 substations, and 18 sectionalising (track-paralleling) huts; the laying of 242 miles of 100 lb. conductor rails



Detail of welded and strip rail bonds for negative return current passing through the running rails

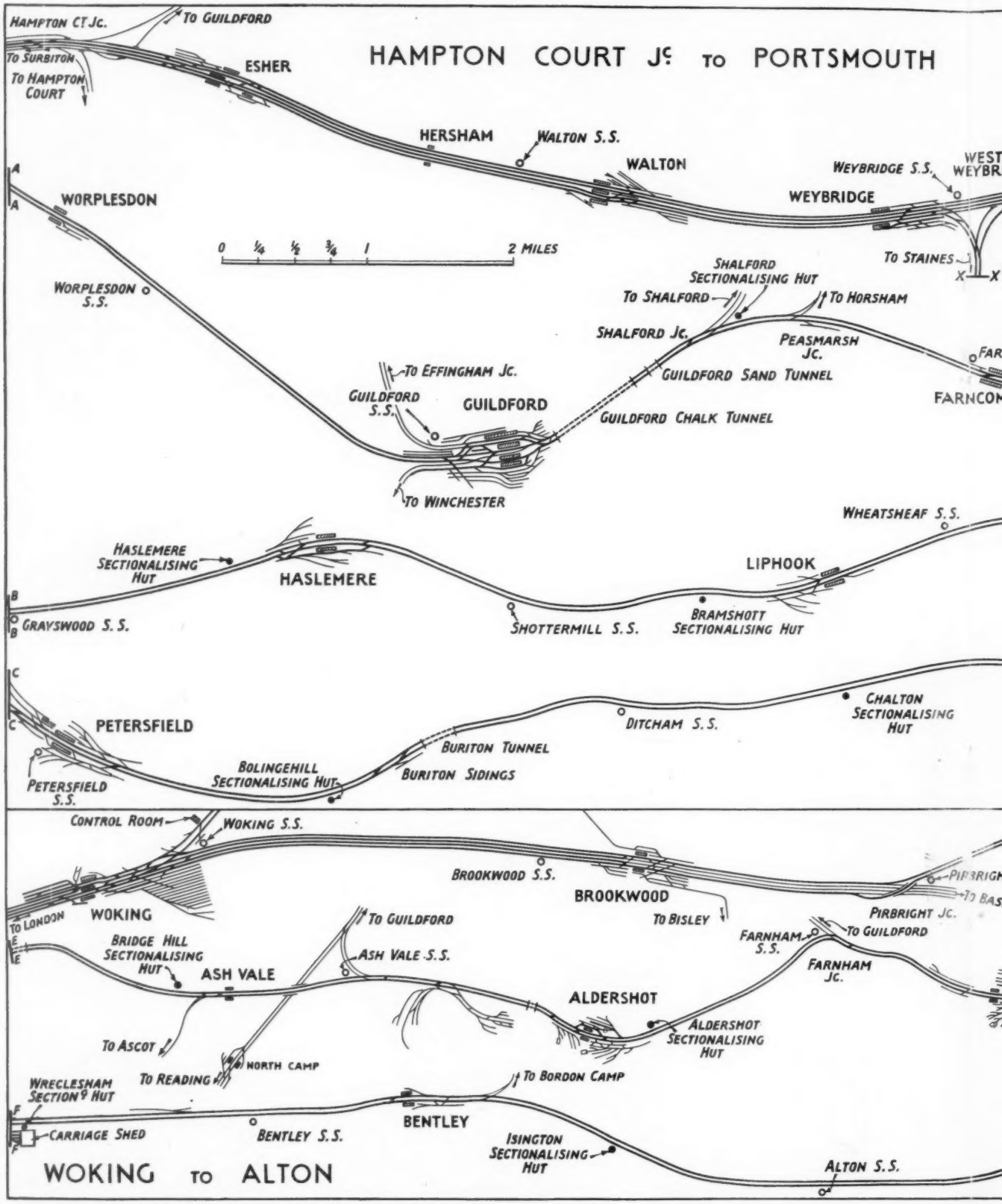
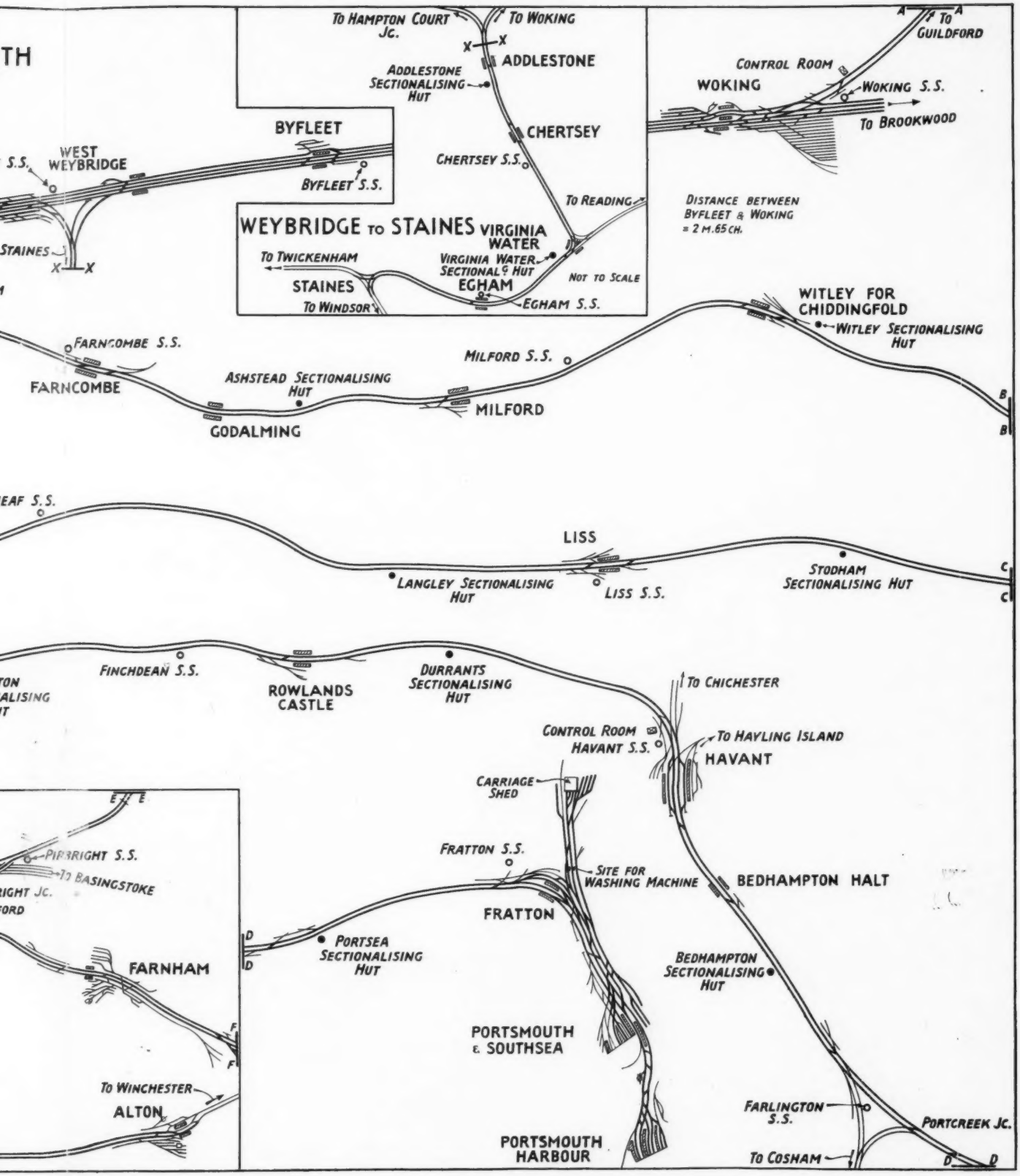


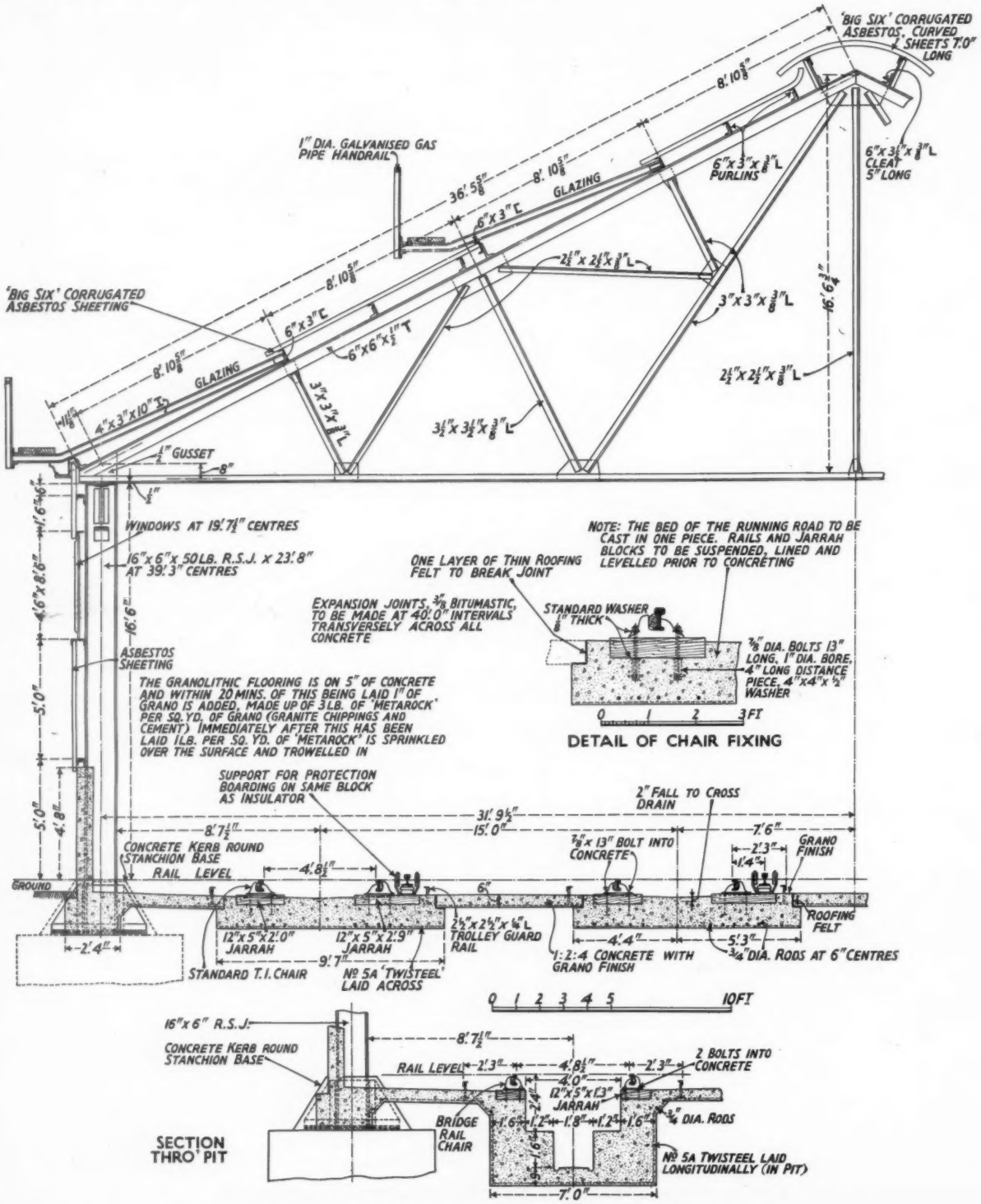
Diagram of the newly electrified tracks between Hampton Court junction and Portsmouth, the Woking-Alton line,



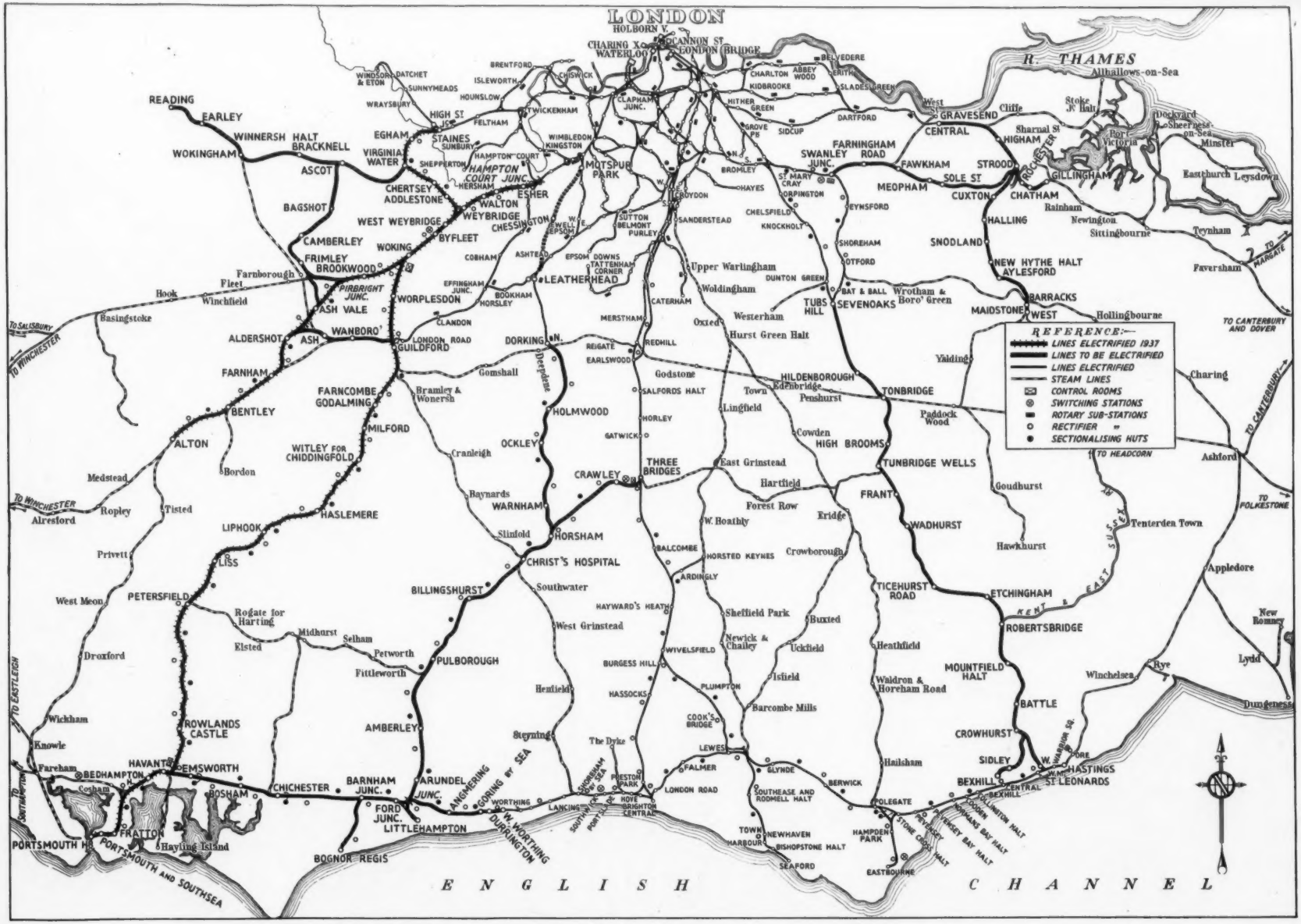
g-Alton line, and the Egham and Staines branch, showing position of substations and track-paralleling huts

on about 140,000 porcelain insulators, and almost 200 miles of high-tension cable (fed out from drums mounted on specially adapted 10-ton wagons); and the welding of 150,000 copper bonds to the heads of the running rails for the return of the negative current. These bonds are illustrated and described in the section on Power Supply and Distribution, and by an accompanying drawing.

A good deal of alteration has been made to the lighting of the various stations along the newly-electrified route, and by the adoption of certain safety devices the use of the 660-volt traction current for station lighting has become practicable. At certain places overhead water supply has been installed for filling tanks in corridor trains. For this purpose lagged mains are used with lengths of armoured hose dropping to a point near the ground.



Cross-section of the Southern Railway's standard car shed for electric stock



Map of Southern Railway electrified lines showing old, new and future conversion

Traffic Operation

THE Portsmouth line has quite a heavy traffic throughout the year, but the main characteristics are a seasonable variation, above the top level of which may be superimposed extra peaks, such as the Navy Week traffic handled in the midst of the summer holiday rush to and from the Isle of Wight and Southsea. Although the density of traffic with electric operation is not so great on the average as it is on the Brighton line, the relief afforded by conversion is, if anything, greater, for the two banks in each direction between Guildford and Havant, with grades as steep as 1 in 80, have always proved limiting factors to the weight, timing, and punctuality of steam trains, whereas with electric traction they are surmounted without trouble at an almost constant speed.

For the fast trains a four-car vestibuled set is the basic unit, from which are built up eight and twelve-car trains according to the time of day and the requirements of the traffic. One of the four-car sets in all of these trains contains a kitchen car, so that every express train has a refreshment or restaurant service. The stopping trains are composed of one or more two-car units of the corridor non-vestibuled type. A total of 312 carriages has been found necessary to maintain the electric services on the Portsmouth and Alton routes.

Standardised Services

As usual with Southern electrified main line extensions, a standardised timetable has been introduced to give increased up and down regular services in all categories, and the total electric train mileage of 4,188,168 a year has replaced 2,235,464 steam train miles, an increase of 88 per cent. compared with the 68 per cent. increase on the Eastbourne and Hastings line electrified in 1935.

The standard basis of the new timetables is one fast train an hour between London (Waterloo) and Portsmouth Harbour in each direction, calling at Guildford, Haslemere, and Portsmouth & Southsea; two stopping trains an hour in each direction running non-stop between Waterloo and Surbiton, and then calling at all station between Surbiton and Portsmouth & Southsea. These trains are made up in two sections, one of which is detached or attached at Woking to serve all stations on the Aldershot-Farnham-Alton line. The Weybridge, Virginia Water and Staines trains are considered as forming part of the Western Section suburban services, although the tracks were electrified as part of the Portsmouth scheme.

On Saturdays in the summer the standard service over the Portsmouth direct line is increased by three fast trains an hour in each direction, one of which runs non-stop between Waterloo and Portsmouth & Southsea in the down direction, and from Portsmouth Harbour to Waterloo in the up direction, thus catering particularly for Isle of Wight passengers. The second calls only at Havant (connection to Hayling Island); the third only at Guildford and Portsmouth & Southsea; and the fourth makes the normal weekday fast trip with calls at Guildford, Haslemere, and Portsmouth & Southsea. The Sunday service is made up as traffic requirements dictate, with a minimum increase of one fast train an hour in each direction in the summer, plus special excursions organised by the S.R. and the National Sunday League.

Over the Portsmouth main line the arrangements are such that one of the two stopping trains in each hour arrives at Guildford six minutes in advance of the hourly express, and leaves again four minutes after it, thus providing a good connection from intermediate stations on the London side of Guildford to Haslemere and Portsmouth, and in addition giving a fast journey from Waterloo to the stations beyond Guildford. A similar arrangement is in force for up trains, one of which arrives at Guildford five minutes before the express (having left Portsmouth & Southsea 24 min. before it), and leaving five minutes after it. On Saturdays in the summer the two stopping trains have to be sandwiched in between four express services, and one of them in each direction is passed at Guildford by two fast trains, only one of which stops at that station.

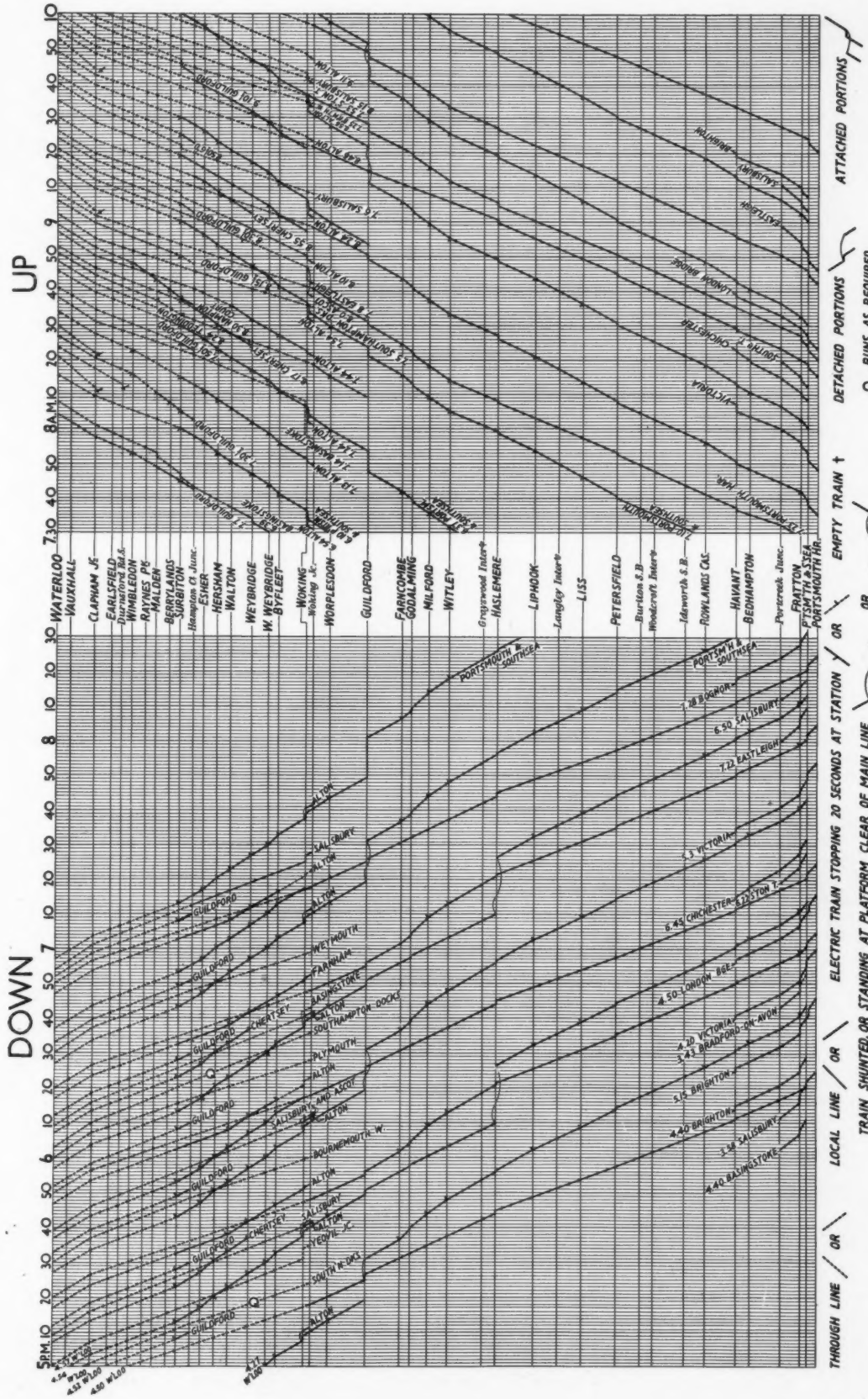
On weekdays the down fast trains leave Waterloo at 50 min. past the hour from 7.50 a.m. to 9.50 p.m. and at 11.50 p.m., with additional semi-fasts, to cater for the evening business requirements at 4.20, 5.20, and 6.20 p.m. The stopping trains depart from Waterloo at 27 and 57 min. past the hour for Portsmouth & Southsea and Alton, from 5.27 a.m. to 10.27 p.m., and at 10.57 p.m. for Guildford and Alton; 11.27 p.m. for Guildford and Farnham, and at 12.7 a.m. for Guildford and Alton. In the up direction the fast trains leave Portsmouth Harbour at 20 min. past every hour from 9.20 a.m. to 10.20 p.m., with additional business semi-fasts at 7.23, 7.34, 8.15, 8.20, and 8.42 a.m. The stopping trains start from Portsmouth & Southsea station, and leave at the hour and half-hour. Typical timetables over normal one-hour periods on weekdays and Saturdays are given below.

Acceleration and Frequency

From the typical timetables it will be seen that the standard non-stop run from Portsmouth Harbour to Waterloo, 74·5 miles, is 92 min., being equivalent to an

Down. p.m.				WEEKDAY		Up. a.m.		
2 57	3 27	3 50	dep.	Waterloo	arr.	12 16	11 54	12 46
3 49½	4 19½	4 25	arr.	Guildford dep.	dep.	11 23½	11 18½	11 53½
4 1	4 31	4 26	dep.	Guildford arr.	arr.	11 12	11 17	11 41
4 26	4 56	4 44	arr.	Haslemere dep.	dep.	10 49	11 2½	11 19
4 26½	4 56½	4 45	dep.	Haslemere arr.	arr.	10 48½	11 1½	11 18½
5 13½	5 43½	5 20	arr.	Portsmouth & Southsea dep.	dep.	10 00	10 24	10 30
		5 22	dep.	Portsmouth & Southsea arr.	arr.		10 23	
		5 25	arr.	Portsmouth Harbour	dep.		10 20	

Down. a.m.						SATURDAY		Up. p.m.				
10 15	10 20	10 27	10 45	10 50	10 57	dep.	Waterloo	arr.	4 16	3 49	3 55	4 46	4 21	4 27
	10 55½	11 19½		11 26	11 49½	arr.	Guildford dep.	dep.	3 23½		3 20	3 53½		3 50
	10 58	11 31		11 27	12 1	dep.	Guildford arr.	arr.	3 11		3 18½	3 41		3 47½
		11 56		11 45	12 26	arr.	Haslemere dep.	dep.	2 49		3 3½	3 19		
		11 56½	Stops at Havant 12 5½/12 8	11 46	12 26½	dep.	Haslemere arr.	arr.	2 48½		3 2½	3 18	Stops at Havant 2 59/3 0	
11 45½	11 51½	12 43½		12 21	1 13½	arr.	Portsmouth & Southsea dep.	dep.	2 0		2 24	2 30		2 54
11 47	11 53			12 23		dep.		arr.			2 23			2 53
11 50	11 56		12 21	12 26		arr.	Portsmouth Hbr.	dep.		2 17	2 20		2 47	2 50



Graphic timetables showing traffic density during selected periods on the London-Portsmouth line

average speed of 48·5 m.p.h. The standard timing of 35 min. down and 35½ min. up between Waterloo and Guildford, 30·3 miles, represent averages of 52 and 51·3 m.p.h. From Haslemere to Portsmouth the standard express timing for the 30·5 miles is 35 min., giving an average of 52·2 m.p.h.

The present and previous standard weekday times from Waterloo to different stations with the fast electric services are as given in the accompanying table.

	Electric min.	Steam min.	Gain, per cent.
Guildford	35	45 av.	22
Haslemere	54	73 av.	26
Portsmouth & Southsea	90	113 av.	20
Portsmouth Harbour	95	116 av.	18

COMPARATIVE SUMMER SERVICES

Between	Steam		Electric		Percentage increase	Average acceleration
	No. of Services. Weekdays	Average time on journey	No. of Services. Weekdays	Average time on journey		
		hr. min.		hr. min.		min.
London and Woking	NS. 48	0 42	NS. 68	0 36	41	6
	SO. 46		SO. 67		45	
Woking and London	NS. 44	0 44	NS. 69	0 36	57	8
	SO. 46		SO. 70		52	
London and Guildford	NS. 30	0 56	NS. 59	0 46	97	10
	SO. 30		SO. 59		97	
Guildford and London	NS. 27	0 56	NS. 57	0 47	111	9
	SO. 27		SO. 57		111	
London and Haslemere	NS. 25	1 26	NS. 40	1 11	60	15
	SO. 26		SO. 40		54	
Haslemere and London	NS. 24	1 22	NS. 38	1 8	58	14
	SO. 24		SO. 38		58	
London and Portsmouth & Southsea	NS. 18	2 4	NS. 36	1 55	100	9
	SO. 16		SO. 36		125	
Portsmouth & Southsea and London	NS. 15	2 2	NS. 36	1 52	140	10
	SO. 14		SO. 36		157	
London and Portsmouth Harbour	NS. 11	2 4	NS. 19	1 38	73	26
	SO. 11		SO. 19		73	
Portsmouth Harbour and London	NS. 10	1 57	NS. 19	1 37	90	20
	SO. 10		SO. 19		90	
London and Aldershot	NS. 18	1 4	NS. 46	0 59	155	5
	SO. 18		SO. 46		155	
Aldershot and London	NS. 22	1 9	NS. 45	0 58	104	11
	SO. 20		SO. 45		125	
London and Alton	NS. 16	1 34	NS. 40	1 19	150	15
	SO. 16		SO. 40		150	
Alton and London	NS. 16	1 16	NS. 39	1 20	144	16
	SO. 16		SO. 40		150	
Connections to Isle of Wight						
London and Ryde	NS. 10	3 3	NS. 13	2 27	30	36
	SO. 11		SO. 13		18	
Ryde and London	NS. 9	2 45	NS. 16	2 24	77	21
	SO. 10		SO. 16		60	
London and Shanklin	NS. 10	3 48	NS. 13	3 12	30	36
	SO. 11		SO. 13		18	
Shanklin and London	NS. 9	3 24	NS. 15	3 0	67	24
	SO. 10		SO. 15		50	
London and Newport	NS. 10	3 55	NS. 13	3 23	30	32
	SO. 11		SO. 13		18	
Newport and London	NS. 9	3 40	NS. 15	3 15	67	25
	SO. 10		SO. 15		50	

These accelerations have been accompanied by a two-fold increase in the train service. Portsmouth, which had eight express trains a day with steam traction, now has 16, an increase of 100 per cent. The 12.0 midnight steam train which ran on Wednesdays only and reached Portsmouth & Southsea at 2.5 a.m., has been replaced by the 11.50 p.m. standard electric train with kitchen car running every night in the week, and reaching Portsmouth & Southsea at 1.26 a.m., thus giving a theatre service to suit everyone. The Haslemere service also has gone up by 116 per cent., including the stopping services, namely, from 25 to 54 trains a day in each direction, and all of them now are through trains, whereas in steam days it was necessary to change at least once on many of the services. The Hayling Island branch, still worked by a Stroudley "Terrier," has not been given an increased number of trains.

Alton Services

The Aldershot line has traffic of a similar kind to that on the Portsmouth main line, culminating in the Tattoo week, when something like 58,000 passengers are transported to and from the Aldershot area. On this route the increased frequency is again over 100 per cent., and all of the 45 electrics in each direction which originate or terminate west of Woking are through trains. Moreover, this increased frequency has been achieved in conjunction with standard timings of 61 min. to Aldershot and 79 min. to Alton, excluding accelerated business trains, compared with respective times of 58 to 106 min. and 87 to 136 min. in steam days.

Apart from the early morning services leaving Waterloo at 5.27, 5.57, 6.27 and 6.57 a.m., all the Aldershot and Alton trains run fast to Surbiton and stop thereafter, being separated from the Portsmouth stopping portion at Woking, as explained previously. There is a corresponding marshalling process at Woking in the reverse direction. The Alton departures from Waterloo thus are at 27 and 57 min. past the hour from 5.27 a.m. to 10.27 p.m., with late trains to Alton (and Guildford) at 10.57 p.m., to Farnham (and Guildford) at 11.27 p.m., and to Alton (and Guildford) at 12.7 a.m. In the down direction there are eight extra business trains between 4.17 and 7.17 p.m. In the up direction the standard trains leave Alton at 24 and 54 min. past the hour from 6.54 a.m. to 10.24 p.m., then at 11.14 p.m. and 11.44 p.m., and in the morning there are nine additional trains from Alton, Farnham, or Woking between 6.53 and 9.55 a.m. The improvements in the frequency and running time of the services on both the Portsmouth and Alton routes are summarised in an accompanying table.

Operating Factors

Great difficulty not unnaturally was experienced in getting an increased regular service on the Portsmouth line to the accelerated timings which were desired, for not only had the paths for the faster extra trains to be found on the through fast tracks between Waterloo and Woking, over which a heavy traffic to Southampton and the West of England was operated, but the timings governed by this traffic also had to fit in with the schedules of trains on the Sussex coast route, which use the same tracks, one up and one down, between Havant and Portsmouth Harbour. Further, at this south end, there were to be considered also the trains running into Portsmouth from the Cosham direction, and joining the route at Portcreek Junction, and as some of these originate on the Great Western Railway, it was obvious that as little disturbance as possible to existing extraneous schedules was essential. Finally, the timings from Waterloo and the incidence of trains over the Havant—Portsmouth section must dovetail with the increased train service over the Victoria—Horsham—Chichester and Brighton and Portsmouth routes when electrification is introduced on these lines in 1938.

Except in special cases the Portsmouth—Alton combined trains use the through tracks between Waterloo and Surbiton, so that both the fast and stopping Portsmouth services must be arranged in relation to the West of England trains. Westwards from Surbiton, of course, the combined Portsmouth—Alton trains use the local tracks, as they stop at intermediate stations. The insertion of these extra electric trains has given an extremely high density of traffic over the fast track between Waterloo and Woking in the summer season, up to a maximum of 40 down trains in two hours over one track on Saturday mornings.

Rolling Stock

✱

A TOTAL of 312 new or rebuilt vehicles has been constructed to operate the electrified services on the Portsmouth, Alton and Weybridge routes. All this stock has been built to the designs and requirements of Mr. R. E. L. Maunsell, the Chief Mechanical Engineer, but the complete electrical equipment has been the responsibility of Mr. Raworth, Electrical Engineer for New Works.

With the exception of two types of vehicles, *i.e.*, the first class and third class restaurant cars, built respectively by the Metropolitan-Cammell Carriage & Wagon Co. Ltd. and the Birmingham Railway Carriage & Wagon Co. Ltd., all the vehicles have been manufactured or rebuilt in the Southern Railway's own workshops at Eastleigh and Lancing.

Details of the stock are as given in the accompanying table. The two-car trailer sets, three-car motor sets and two-car motor sets are required to cover the extension of existing suburban services over the London end of the new scheme. The two-car motor corridor sets with lavatory accommodation are being used on the main line stopping trains and the four-car corridor vestibuled sets for express work. Items *a*, *b*, and *c* in the accompanying table have been provided by the conversion of existing ordinary coaches mounted on new underframes and bogies.

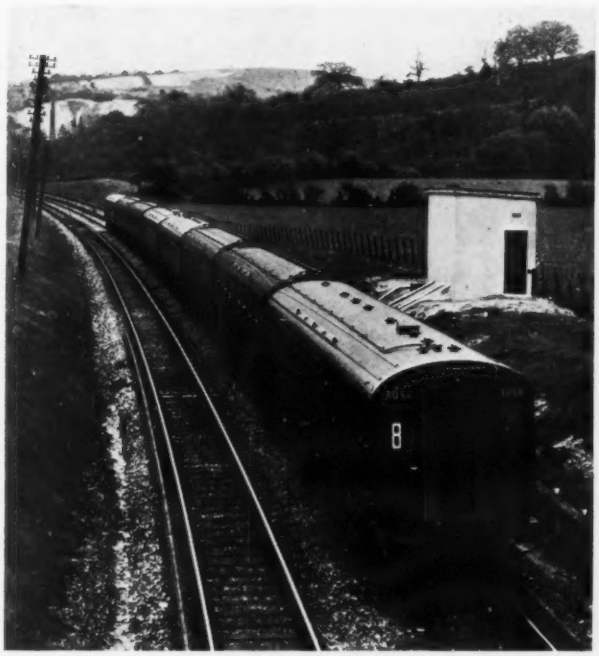
Ref. No.	Description.	No. of sets	No. of cars
a	Two-car trailer sets	5	10
b	Three-car motor sets	6	18
c	Two-car motor sets	8	16
d	Two-car motor corridor sets ..	38	76
e	Four-car vestibuled sets ..	29	116
f	Four-car vestibuled sets with restaurant cars	19	76
	Total ..	.. ..	312

The leading dimensions of the various types of coaches, and the make-up of the two four-car express formations are indicated on the diagrams on following pages. As regards the express stock, one of the main differences compared with previous trains is the adoption of a four-car basic unit in place of six-car rakes.

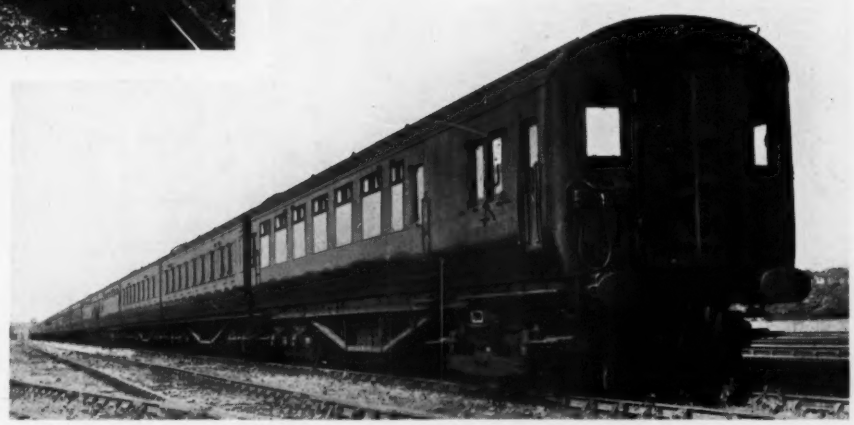
Express Stock

The motor coaches in the present trains differ from the Brighton and Eastbourne vehicles in being carried on one motor bogie and one trailing bogie. There are two motor-coaches with an aggregate of four motors in each four-car train. The motor bogie is of the same type as that fitted to the Brighton stock (see special supplement to THE RAILWAY GAZETTE, December 30, 1932), and the trailing bogie is of the normal suburban stock design.

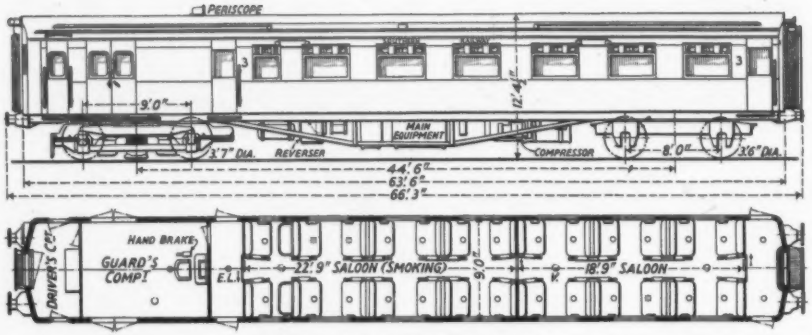
Another new feature of the Portsmouth trains is that vestibuled connections are provided at both ends of all four-car trains, so that whatever the formation there is end-to-end communication. The passage through the vestibules, past the driving cabin, at each end of the four-car set has been arranged in an ingenious manner, the principle of which can be seen from the car diagrams. The gangways at the faceplates are constructed with sliding doors which present an almost flush appearance when the doors are closed. A hinged door is fitted in the gangway, and is locked in the shut position when the driver is in his cabin, thus enabling him to move to the other side of the coach. When two rakes are coupled together



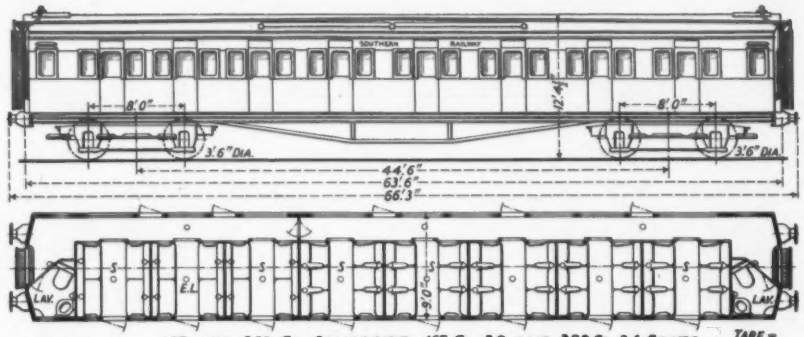
Above: Two of the four-car non-restaurant sets in service on the Portsmouth main line



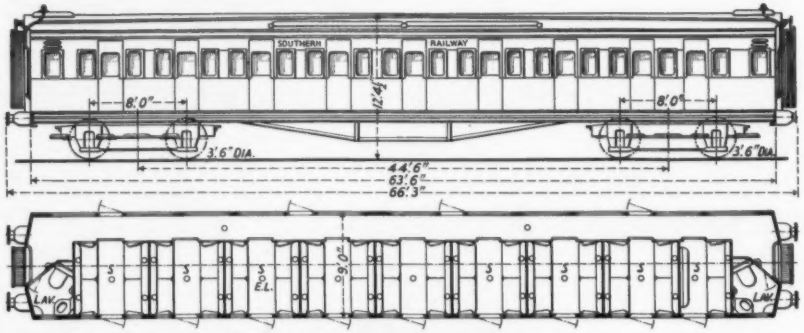
Right: A line of the four-car express sets in Gatwick sidings



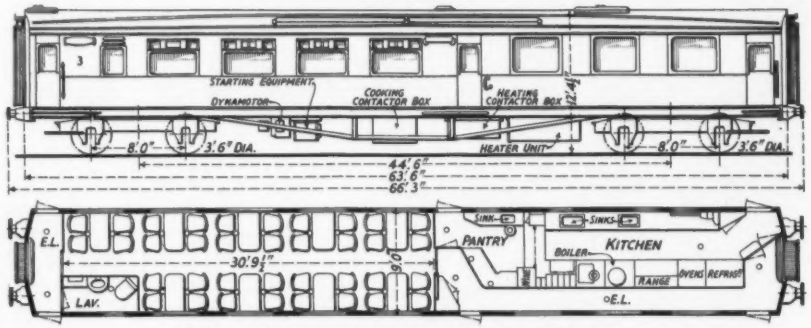
3RD CL. MOTOR BRAKE 52 SEATS — TARE-46T. 10C. 2Q.



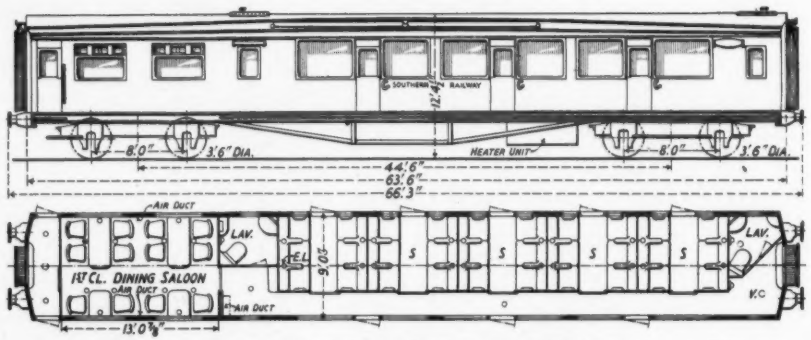
S-SMOKING COMPT 1ST AND 3RD CL. COMPOSITE 1ST CL. 30. AND 3RD CL. 24 SEATS TARE-32T. 12C.



S-SMOKING COMPT 3RD CL. CORRIDOR 68 SEATS TARE-32T. 13C.



3RD CL. RESTAURANT AND KITCHEN CAR 36 SEATS TARE-35T.



S-SMOKING COMPT RESTAURANT AND COMPARTMENT FIRST, 42 SEATS TARE-33T.

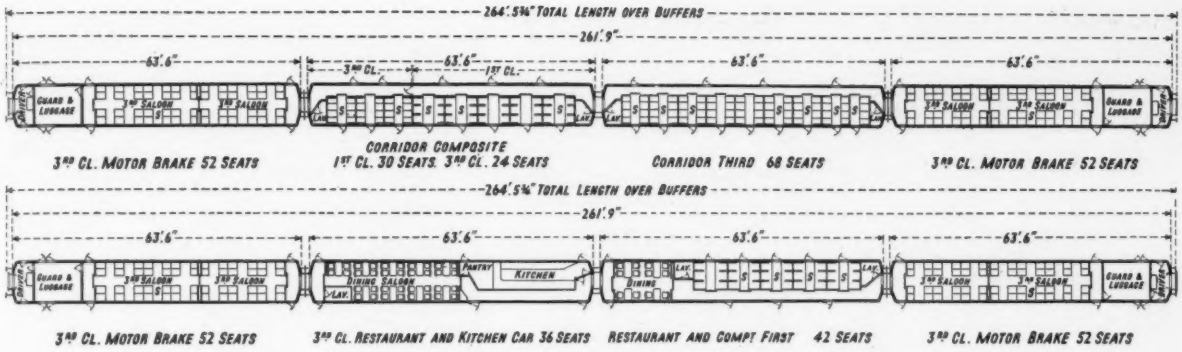
Top left: Third class motor-coach used at each end of four-car set. Each of these cars has two traction motors

Middle left: Third class corridor coach used in non-restaurant four-car sets

Top right: Composite first and third class coach used in non-restaurant formations

Bottom right: Third class restaurant and kitchen car

Bottom left: First class restaurant and compartment coach



Top: Diagram of four-car main-line train for the Portsmouth service
Bottom: Diagram of four-car train with first and third class restaurant cars

this vestibule door is opened by bringing it back against the driving-cabin, locking up the latter and providing a through way for passengers. The vestibules themselves are of canvas with Rexine curtains round the interior.

The bodies of the main-line vehicles have hardwood framing and exterior panels of galvanised steel. The floors are of corrugated galvanised steel sheets suitably bonded for taking either Decolite and/or Induroleum, which is overlaid with granite pattern linoleum. Canvas-covered timber is used for the roof. The motor-coaches are of the saloon type with fixed windows having above them Mead & McLean Airstream ventilators of the pattern used so successfully on the Eastbourne electric stock and on other Southern vehicles. The fixed windows have Alpax frames, and the drop windows in the doors are of the Beclawat Weatherproof frameless type. A great deal of care has been taken to obtain a harmonious form of decoration for the first class compartments, and four decorative schemes employing the use of contrasting figured veneers above the seats have been used in conjunction with the general finish of the compartments which is of Indian silver greywood, African mahogany or American black walnut.

Restaurant Cars

The first class restaurant car is a composite dining saloon and ordinary compartment vehicle; the third class restaurant car is a combined diner and kitchen vehicle. In view of the relative shortness of the run down to Portsmouth, and the probable demand for light and quick meals, separate chairs made by Heal & Son Limited have been used in both classes, and the tables are of the lift-up pattern with Rexine tops. These cars are fitted with Stone's electric air-conditioning plant which introduces a continuous supply of filtered fresh air into the saloons, and in cold weather heats the air under thermostatic control. The equipment is located beneath the underframe and the air is delivered through ducts along the bottom of the side panels. The ventilation system in the dining saloons is completed by Airstream ventilators above the fixed lights and Mead & McLean's Monsoon extractors in the roof.

An all-electric kitchen with most comprehensive equipment is located between the first and third dining saloons. The cooking plant has been made by J. Stone & Co. Ltd., and comprises a cooking range with four boiling plates and two grills, four roasting ovens and one steaming oven, and a carving well with a hot press for plates below it. There are a boiler, coffee-making machine, milk boiler, soup boiler and egg boiler made by W. M. Still & Sons, Ltd., and a refrigerator and wine-cooling cabinet made by British Automatic Refrigerators Limited. Stainless steel is used in the kitchen for the table tops and for those portions of the walls which are likely to become dirty in service. Above the stainless steel the interiors are white enamel. Below the table tops the woodwork is painted light green. The kitchen and pantry compartments are separated by Haskins roller shutters, and all fittings are chromium-plated.

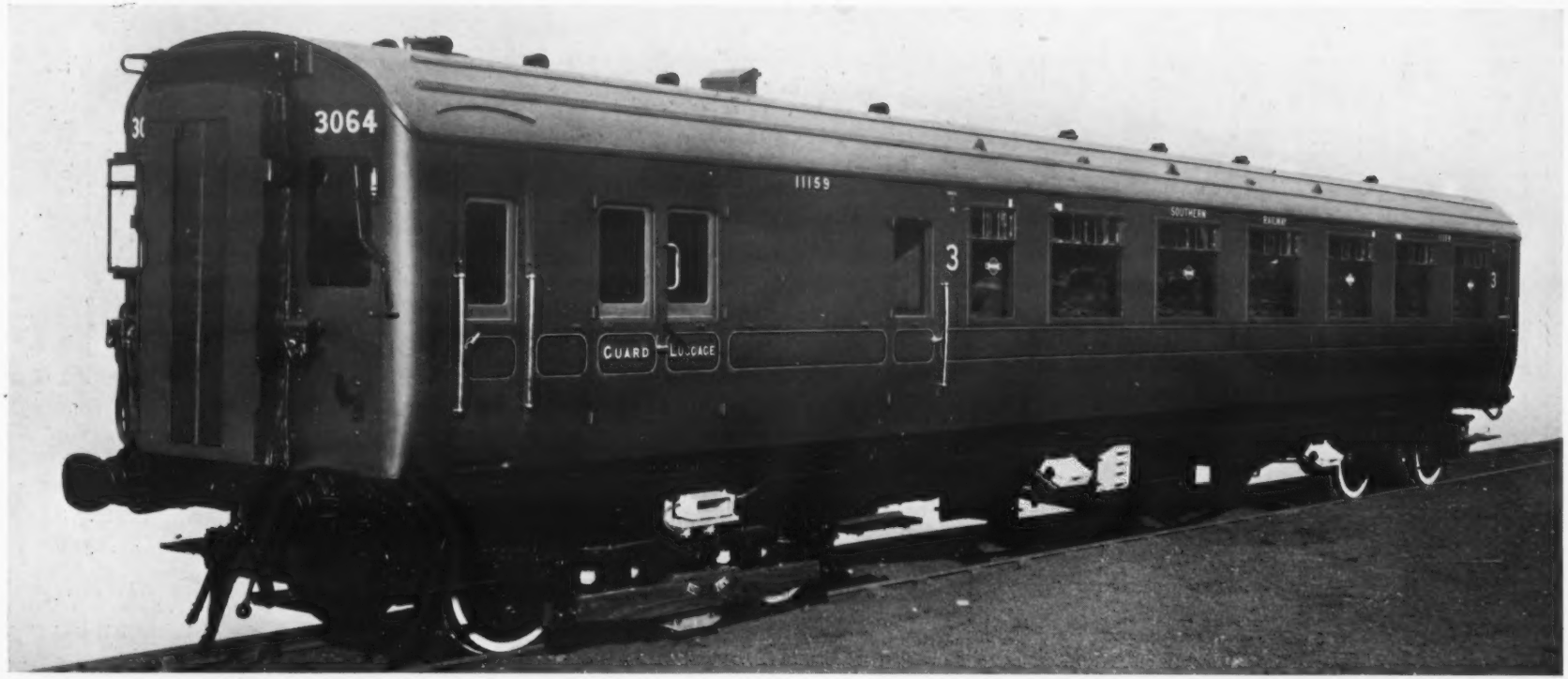
Part of the electric supply for the cooking is taken from the 660-volt traction supply (boiler, ovens, and hot closet) and the remainder (grills, hot plates and refrigerator) from the low-tension side of a 660/200 volts dynamotor. The maximum electric load of the kitchen is 25½ kW. on the 660-volt supply and 16½ kW. on the 200-volt side. The only 660-volt circuit actually under the control of the kitchen staff is the quick-break rotary switch for the dynamotor control starting switch. The 660-volt cooking circuits are remote-controlled by means of contactors mounted in a box on the underframe, with control-circuit operating switches mounted on a panel above the range. Alongside this panel are the switches for the 200-volt supply. The refrigerator motor and compressor are supported below the underframe and the compressor is connected by pipe lines to the cooling elements in the cabinets.

Traction Motors

The stopping service stock is provided with the standard motor equipment for suburban stock, viz., two totally enclosed motors of 275 h.p. each on the one-hour rating, being fitted to each motor-coach. The motor is a totally-enclosed nose-suspended series interpole type with solid yoke, sleeve armature bearings and split-sleeve axle suspension bearings. It has proved to be an exceptionally robust and stable machine free from mechanical and electrical troubles and with a very low maintenance cost.

The express stock traction motor was specially designed in 1931 for the extension of the Southern Railway electrification to Brighton. It is a totally enclosed motor and with the long non-stop runs on this service it was necessary to take steps to increase the continuous rating of the machine which was done by increasing the exterior heat dissipating surface of the frame by ribbing.

The armature slots are tapered, so that instead of a more usual condition with a square slot and a tooth tapering from the circumference to a root at the bottom of the slot, this motor has a square tooth and slot tapering from the circumference of the armature towards the bottom of the slot. The tapered armature winding coil is obtained by using wedge-shaped copper conductors. The copper strip is rolled the combined depth of the top and bottom bars in the slot, and is then split at a point nearer the thick end of the wedge than the middle so



Above: Third class open saloon motor-coach, with one motored and one trailing bogie

Left: Interior of first class compartment in main-line train

Right: Interior of third class restaurant car on the Portsmouth four-car sets

that the cross sectional area of the narrow part equals that of the thick part.

This motor has proved entirely satisfactory, and its performance has fulfilled expectations. Including 192 manufactured for the Portsmouth via Woking extension, there are now 550 of these motors in service on the Southern Railway. It is a nose-suspended series interpole motor with solid yoke, sleeve armature bearings, and split-sleeve axle suspension bearings.

Control Equipment

As the result of the experience gained with the electro-pneumatic control equipments of the Brighton extension, it was decided to standardise this type of control equipment for future work for all types of units.

The equipments for the Portsmouth extension are practically identical for express and suburban stock. For instance, the line switches, reverser and main contactor groups are interchangeable, and the main resistances are built up of the same mounting details and grids, although, of course, the ohmic values of the actual resistance steps differ in the two equipments. All details such as junction boxes are interchangeable. Both equipments are underframe mounted, and the low voltage control supply in each case is 70 volts. On the express units this is obtained from a motor-generator set as on the original Brighton trains.

On the stopping service stock the 70-volt control is obtained by means of a potentiometer across the 660-volt potential, and the only additional equipment necessary to enable these units to multiple with the existing suburban units equipped with 660-volt electro-magnetic control consists of three small train line contactors which are energised from the 660-volt control lines, and which in turn energise the corresponding 70-volt circuits. One of the accompanying drawings shows the two types of main control circuits coupled together.

Multiple Operation with Different Controls

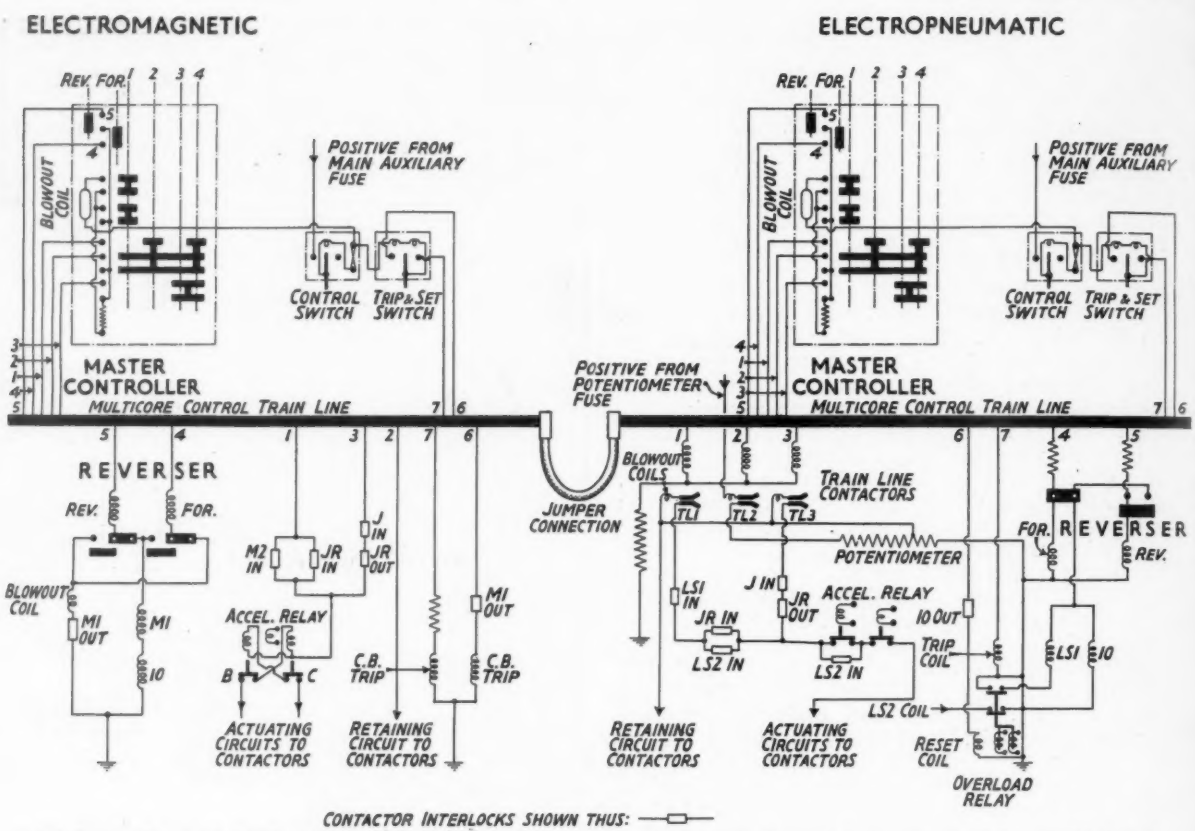
The electro-magnetic contactors *M1* and *M2* are replaced in the electro-pneumatic equipments by line switches *LS1* and *LS2* which are fitted with heavy duty arc boxes and an overload relay rendering the use of a separate circuit breaker, as on the electro-magnetic equipment, unnecessary. The overload relay contacts open the control circuits to the line switches should the current in either motor circuit become excessive.

When the controller reverser key is thrown in the required direction and the controller is moved to the first (shunt) notch the 600-volt train line is energised and the reversers throw or remain in the same positions according to their previous operation. At the same time contactors *M1* and *10*, and *LS1* and *10* are closed through the reverser interlocks. Both the electro-magnetic and electro-pneumatic reversers are operated by line voltage, the electro-pneumatic reversers of the new equipments being connected in series with resistances so as to reduce the supply voltage to the required figure.

The energising of No. 2 wire from the controller actuates electro-magnetic contactor *JR* direct, and also actuates the electro-pneumatic equipment train line contactor *TL2* which closes the 600-volt feed to the potentiometer. The 70-volt tap of the latter is connected to the operating coil of electro-pneumatic contactor *JR* so that the two equipments simultaneously take up the first series connection of the motors. Further movement of the controller to full series notch energises No. *1* wire which gives a feed to the accelerating relays on the electro-magnetic equipment and also actuates the electro-

Interior of kitchen in the composite cars for the Portsmouth service

Train made up of two-car sets for slow main-line and suburban work



CONTACTOR INTERLOCKS SHOWN THUS: —□—

Diagram of control circuits of cars with electro-pneumatic and electro-magnetic control systems coupled in multiple-unit

pneumatic equipment train line contactor *TL1* which closes the potentiometer feed to the current limit relay of its equipment, and both the electro-magnetic and electro-pneumatic equipment notch up automatically to full series under the control of their respective relays.

Movement of the controller to the first parallel notch energises No. *3* wire, which performs the transition from full series to first parallel on the electro-magnetic equipments and gives the same result on the electro-pneumatic equipment by actuating train line contactor *TL3,* while a final movement to the full parallel notch leads to full parallel in the electro-magnetic equipments and gives the same result on the electro-pneumatic equipment by re-closing train iine contactor *TL1* which had been dropped out earlier in the sequence.

The controller with the electro-pneumatic equipments is a duplicate of that with the electro-magnetic equipments and operates on the 600-volt train lines, so that the same results are obtained from whichever driving position is in use. On the electro-magnetic equipments a main circuit breaker is provided which is fitted with trip and reset movements controlled from a switch in the driver's cab. The overload relay on the electro-pneumatic equipment is similarly controlled through the same train lines, and in general the driving positions are similar for the two types of equipment.

Lighting and Heating

On the express stock the compartment lights are supplied by the motor-generator sets. The saloon motor-coaches are lighted by two rows of roof lights, a proportion of which are permanently lit up, the remainder being under the control of the passengers. In each compartment, both first and third class, the roof centre lights are permanently lit up, and the four bracket shoulder lights are under passenger control. An emergency lighting battery is provided on this stock, which in the event of a failure of the supply current will maintain the full lighting load for a considerable period, or the permanent lights alone for several hours. The stopping service stock is lighted by two 60-watt roof lights per compartment.

The compartment heating throughout is by means of electric resistance heaters, the arrangement and disposition of which has been carefully considered with a view to ensuring the maximum comfort for the passengers.

All lavatory compartments are provided with electrically heated thermostatically-controlled storage-type water heaters. In the case of the express stock the thermostats operate on a 70-volt control supply, operating an electro-magnetic contactor which switches the 600-volt supply to the heating elements. On the stopping service stock where no 70-volt control supply is available a Birka vacuum tube switch is utilised for switching.

Contractors for Rolling Stock, Signalling and Civil Engineering

Birmingham Railway Carriage & Wagon Co. Ltd.
Metropolitan-Cammell Carriage & Wagon Co. Ltd.
Lightalloys Limited
Mead, McLean & Co. Ltd.
Geo. Spencer, Moulton & Co. Ltd.
J. W. Roberts Limited
Westinghouse Brake & Signal Co. Ltd.
I.C.I. (Rexine) Limited
Beckett, Laycock & Watkinson Limited
Barrow Haematite Steel Co. Ltd.
Cargo Fleet Iron Co. Ltd.
W. R. Sykes Interlocking Signal Co. Ltd.
Wraysbury Sand & Gravel Co. Ltd.
Guest, Keen & Nettlefolds Limited
W. A. Bonnell Limited
Vaughan Crane Co. Ltd.
British Vacuum Cleaner & Engineering Co. Ltd.
J. Stone & Co. Ltd.
W. M. Still & Sons Ltd.
Taylor Bros. & Co. Ltd.
Steel, Peech & Tozer Limited
T. F. Firth & Sons Ltd.